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CONTENTS AND DIGEST

Urinary Antisepsis: A Study of the Antiseptic Properties and the Renal Excretion of Compounds Related to Phenolsulphonephthalein: Preliminary Report. Edwin G. Davis, M.D., Baltimore 581

The ideal internal urinary antiseptic. Report on experiments with various compounds. Methods of injection. Bacteriologic technic. Phenolsulphonephthalein and salts. Halogen derivatives of sulphonephthaleins. Phthaleins and xanthones. Conclusions.

Medical Jurisprudence: the General Rules of Law Governing the Liability of Physicians and Surgeons for Malpractice. Lawrence A. Steinhardt, LL.B., New York.....585

Wide extent of the physician's liability. Obligation to continue in care of a patient. Burden of proof as to medical neglect. The rule against trying experiments. Various breaches of duty. Decisions and statutory provisions in the several states.

Trichinosis: A Report of Three Cases Simulating Meningitis, with the Findings of Trichina Larvae in Spinal Fluid. Jacob Meyer, M.D., Chicago 588

Case reports and comments. Necessity of differentiating cases with meningeal symptoms from those of poliomyelitis. Trichinae in the spinal fluid as a cause of meningitis symptoms.

The Dreyer Method of Agglutination, as Used at the Army Medical School. Eric A. Fennel, M.D., Washington, D. C. 590

Use of agglutination tests on varying dilutions of serum after typhoid and paratyphoid vaccination. Technic and apparatus used in tests. Suggestions to facilitate the work of diluting cultures.

The Urinary Tract in Pulmonary Tuberculosis: A Report of the Study of Six Hundred Cases. S. William Schapira, M.D.; Joseph Wittenberg, M.D., and Sidney L. Spiegelberg, M.D., New York 591

The advisability of nephrectomy in renal tuberculosis. Classification of cases under observation with reference to location of

(Continued on next page)

MILITARY MEDICINE AND SURGERY

Simplified Rules for Tuberculosis Examinations. Henry Farnum Stoll, M.D., Washington, D. C......605

Further Experiences with Dakin's Dichloramin-T in the Treatment of War Wounds. J. E. Sweet, M.D., and Edward B. Hodge, M.D., France..605

The Initiation of Wound Shock. E. M. Cowell, France 607

A Consideration of the Nature of Wound Shock. W. B. Cannon, M.D., France 611

The Preventive Treatment of Wound Shock. W. B. Cannon, M.D.; John Fraser, and E. M. Cowell, France..618

MEDICAL MOBILIZATION AND THE WAR 628

News of the Cantonments.
Disease Conditions Among Troops in the United States.
Promotions.
Orders to Medical Officers.

ENTERED AS SECOND-CLASS MATTER, JUNE 25, 1885, AT THE POSTOFFICE AT CHICAGO, ILLINOIS, UNDER ACT OF MARCH 3, 1879.
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See Page 3

CONTENTS AND DIGEST—Concluded

bacilli. Results obtained from examination of the urine. Conclusions.

A Method of Draining the Bodies of the Vertebrae: Preliminary Report. Leo Mayer, M.D., New York 593

Lack of satisfactory method of draining the bodies of the vertebrae in osteomyelitis. Report of method used on the cadaver. Description of technic.

Profound Toxemia After Administration of Neodiarsenol (a Brand of Neo-Arsphenamin). J. W. Miller, M.D., Cincinnati 594

Danger of arsphenamin and neo-arsphenamin. Report of a case with a fatal outcome. Effect of weather on administration of the drug. Reasons for the accidents.

Duodenal Fistulas. Dudley W. Palmer, M.D., Cincinnati 595

Scarcity of literature on the subject. Peculiar difficulties of treating fistulas. Description of two classes of treatment. Report of cases.

Detection of Pretended Loss of Hearing, with Special Reference to Unilateral Deafness. R. R. Brownfield, M.D. 597

Need of a more accurate test of hearing. The acoumeter and its uses. Description of the author's device and apparatus. Results of experiments, with tests.

The Dust Hazard in Certain Industries. T. Grier Miller, M.D., and Henry Field Smyth, M.D., Philadelphia 599

The authors' methods of collecting and studying dust samples. Standard dust values for Philadelphia. Tests on inorganic dusts. Organic dusts. Summary of averages of dust examination results. Variations in dustiness. Conclusions.

CLINICAL NOTES, SUGGESTIONS, AND NEW INSTRUMENTS

An Unusually Large Vesical Calculus. H. M. McCandliss, M.D., and Nathaniel Bercovitz, M.D., Hoi How, Hainan, China 604

SPECIAL ARTICLE

Gastro-Intestinal Epidemic at Peoria, Ill. 622

NEW AND NONOFFICIAL REMEDIES

Description of Articles Accepted by the Council on Pharmacy and Chemistry 623

Typhoid Vaccine—Bulgarian Bacillus Tablets-Mulford.

EDITORIALS

The Inheritance of Acquired Characters 624

Reopening of the question by the discovery of a specific effect of antibodies on germ cells.

The Control of Meningitis in Army Camps 624

Military considerations that interfere with the combating of the disease by segregation of carriers.

The Vasomotor Mechanism in Shock 625

Reduced circulation as the causative factor.

Increased Rank and Authority for Medical Officers 626

Legislation that would safeguard the health of the Army.

CURRENT COMMENT

War Edema 627

Reports from Germany of a disease apparently due to the diet.

Saving Daylight 627

A plan that is hygienically sound.

Legislation for Commutation of Quarters for Commissioned Officers in the Field 627

A measure for the relief of officers with dependents.

Petition Congress 628

Desirability of an organized appeal to advance needed legislation.

MEDICAL NEWS 635

ASSOCIATION NEWS 640

The Chicago Session.

MARRIAGES 640

DEATHS 640

PROPAGANDA FOR REFORM 642

Nostrums in Retrospect—Shotgun Nostrums.

CORRESPONDENCE 643

The Criteria of the Wassermann Reaction.
Stammering.

QUERIES AND MINOR NOTES 644

The Prochownick Diet.
Stokes-Adams Disease.
Acetylsalicylic Acid (Aspirin).
Permit and Bond for Using and Dispensing Alcohol.

MEDICAL EDUCATION AND STATE BOARDS OF REGISTRATION

Coming Examinations — Pennsylvania July Examination — Rhode Island January Examination 645

BOOK NOTICES 646

MEDICOLEGAL

Choice of Remedies in Action for Malpractice — Position of All-Time County Health Officers 646

SOCIETY PROCEEDINGS 647

Federation of State Medical Boards of the United States.
Annual Congress on Medical Education, Public Health and Medical Licensure.

CURRENT MEDICAL LITERATURE

American Medical Journals

Lumbosacral Pains Considered Anatomically—Genito-Urinary Causes of Low Back Pain—Streptococci and Septic Sore Throat 650

Transient Complete Heart Block — Muscular Dystrophy — Acute Nephritis — Lymphoid Hyperplasias — Chemical Changes in Blood and Urine in Progressive Muscular Dystrophy — Pathologic Process in Progressive Muscular Dystrophy — Effect of Thyroid Secretion on Cardiac Vagus — Experimental Intestinal Obstruction 651

Kidney Function in Senility — Cicatrization of War Wounds — Oxygen in Venous Blood with Circulatory Disturbances 652

Oxygen in Venous Blood with Compensated Circulatory Disturbances—Oxygen in Venous Blood with Incompensated Circulatory Disturbances—Nucleated Red Blood Corpuscles in Peripheral Blood — Distribution of Spirochaeta Icterohemorrhagiae after Serum Treatment — Rosenow's Antipoliomyelitic Serum—Neurotics in Military Service—Purification of Water with Isotonic Sodium Hypochlorite Solution 653

Principles of Anthelmintic Medication — Raynaud's Disease 654

Blood Pressure in Head Injuries — Anomaly in Location of Terminal Ileum 655

Foreign Medical Journals

Mental Deficiency and Binet-Simon Test.. 655

Glandular Enlargement as Evidence of Infection—Study of Pyrexia of Unknown Origin—Secondary Pneumococcus Infection in Meningococcus Meningitis—Chronic Osteomyelitis—Crippled Hands 656

Prophylaxis of Diphtheria Among the Troops—Epidemic Meningitis—Test Glycemia—Test for Blood in Body Fluids and Stools—Welfare Work for Infants in Belgium—Modification of Cow's Milk for Infant Feeding. 657

Closure of the Suprapubic Wound After Prostatectomy—Bradycardia and the Oculocardiac Reflex — Present Status of the Protective Ferments and the Abderhalden Reaction. 658

Action of Camphor on the Heart—Plastic Operation on Superior Longitudinal Sinus—Motor Reeducation — The Cholesterol Content of the Blood Serum with Exudative Diathesis—Abdominal Sign of Undernourishment in Infants—Drainage of Peritoneum Through the Femoral Route—Tar as First Dressing for Wounds—Tumors in the Temporal Lobe—Neurotrophic Edema—Preoperative and Postoperative Treatment of Abdominal Wounds 659

Hypertrophy of the Prostate — The Arterial Pressure—Spasmophiliac Neurasthenia—Operative Treatment of Ankylosis of the Elbow—Primary Tumor of Peripheral Nerve—Retrogression of Cancers—Public Health Problems in Cuba 660

Abdominal Gunshot Wounds — Venereal Diseases and Matrimony—Cesarean Section in Eclampsia—Fatal Electric Shock from Incandescent Bulb Light—Hydrogen Ion Content of the Blood in Different Diseases—Scarlet Fever in Greenland—Stain for Protoplasm and Cilia of Bacteria 661

The Lungs with Valvular Disease — Ascites with Cirrhosis of the Liver — Lung Cavity Simulating Pneumothorax — Silver Staining of Living and Dead Bacteria—Diagnosis of Internal Ear Disease 662

TONICS AND SEDATIVES—BOOKS RECEIVED—THE PUBLIC SERVICE ..... Adv. Page 20

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URINARY ANTISEPSIS

A STUDY OF THE ANTISEPTIC PROPERTIES AND THE RENAL EXCRETION OF COMPOUNDS RELATED TO PHENOLSULPHONEPHTHALEIN: PRELIMINARY REPORT *

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BALTIMORE

The ideal internal urinary antiseptic must be a drug which is chemically stable, nontoxic, and nonirritating to the lower urinary tract; which is antiseptic in high dilution (in urine, as well as in water), and which is eliminated unchanged in high percentage by the kidney. There is no such drug known. A consideration of the properties possessed by phenolsulphonephthalein, however, shows that this compound comes very close to filling all these requirements. Phenolsulphonephthalein is chemically stable, nontoxic and nonirritating, and is eliminated by the kidney with incredible rapidity and completeness; but it has no antiseptic properties, excepting in water in its free acid form. (Clinically it is used as the monosodium salt.) This remarkable compound, synthesized in 1898 by Sohon,[1] at Remsen's[2] suggestion, investigated later in Abel's[3] laboratory, and introduced into clinical use by Rowntree and Geraghty[4] twelve years later, has become the basis of the most widely used and the most satisfactory of all the tests of renal function. This is due to the remarkable rapidity and completeness with which phenolsulphonephthalein is eliminated by the kidney, and to its nontoxicity, and to the ease with which it lends itself to colorimetric estimation. As evidence of nontoxicity, Rowntree and Geraghty have given 1 gram doses to dogs without evidence of renal injury. Its marvelous rapidity and completeness of elimination is realized when one considers that a 6 mg. dose, given intravenously, and therefore diluted about a million times by the blood stream, appears in the bladder in about two minutes; and, after one hour, from 60 to 70 per cent. has been excreted by the normal kidney. Furthermore, about 30 or 35 per cent. of this amount appears during the first fifteen minutes, and about 40 or 50 per cent. during the first half hour. In view of these remarkable properties, it was thought worth while to attempt a modification of the phenolsulphonephthalein molecule, with the hope that an antiseptic compound might be produced which still retained the properties of the original drug. As the problem gradually increased in scope, it was found advisable to investigate a large number of compounds distantly related to phenolsulphonephthalein, as well as those closely related. The total number of compounds experimented with at present is about 195, the antiseptic properties of which will be enumerated in subsequent publications. This is a preliminary report dealing only with compounds closely related to phenolsulphonephthalein.

These compounds were not easily obtained. The original few were supplied by Mr. H. A. B. Dunning of Hynson, Westcott and Dunning, and by Clark and Lubs of the Bureau of Animal Industry, Washington. Other compounds, made and donated through the courtesy of Dr. J. H. Sachs of the Graduate Department of Chemistry, Johns Hopkins University, and still others, obtained here and there from various sources, supplied sufficient material for the first few months of investigation, and gave very interesting results. During the past year, however, the work has been carried out, and is at present being continued, with the collaboration of Dr. E. C. White, chemist in the Brady Urological Institute. A more detailed report, including tables of antiseptic values and rates of excretion, and with discussion of the chemical phases, will shortly be published as a joint article.

Although the literature contains no record of any attempt to synthesize an internal urinary antiseptic, various workers (following the pioneer work of Ehrlich in chemotherapy) during recent years have attempted to correlate chemical structure and physiologic action, and thus produce compounds with a desired specific therapeutic action. It is not my purpose to discuss this literature. For an excellent summary of recent work done along the lines of chemotherapy, the reader is referred to publications of Lewis.[5] The problem which Lewis and his co-worker, Krauss,[6] are investigating is analogous to the problem on urinary antisepsis outlined above, in that they started with a dye (trypan red) which possesses the peculiar property of becoming localized in the caseous centers of tuberculous masses, and experimented with numerous modifications of this compound, with the hope that one might be produced that would inhibit the development of the tubercle bacillus, and still retain the localizing tendency of the original compound.

* From the James Buchanan Brady Urological Institute, Johns Hopkins Hospital.

1. Sohon, M. D.: An Investigation of Some Derivatives of Orthosulfobenzoic Anhydride, Am. Chem. Jour., 1898, **20**, 257.
2. Remsen, I.: On a New Class of Compounds Analogous to the Phthaleins, Am. Chem. Jour., 1884, **6**, 180.
3. Abel, J. J., and Rowntree, L. G.: On the Pharmacological Action of Some Phthaleins and their Derivatives, with Especial Reference to their Behavior as Purgatives, Jour. Pharmacol. and Exper. Therap., 1909, **1**, 231.
4. Rowntree, L. G., and Geraghty, J. T.: An Experimental and Clinical Study of the Functional Activity of the Kidneys by Means of Phenolsulphonephthalein, Jour. Pharmacol. and Exper. Therap., 1909, **1**, 579.
5. Lewis, P. A.: Observations Bearing on the Possibility of Developing an Experimental Chemotherapy of Tuberculosis, Bull. Johns Hopkins Hosp., 1917, **28**, 120; Chemotherapy in Tuberculosis, Am. Jour. Med. Sc., 1917, **153**, 625.
6. Krauss, R. B.: The Preparation of Compounds of Trypan Red with Iodin and Other Substances, Jour. Am. Chem. Soc., 1914, **36**, 961.

Limited space does not permit a discussion of the so-called urinary antiseptics in present use, and of the great need of a really efficient drug for this purpose, which may be given either intravenously or by mouth and which will cause an inhibition of bacterial development in the urine, regardless of the reaction of the latter. For a complete summary of this phase of the subject, and a discussion of the relative values of the various urinary antiseptics in common use, the reader is referred to the paper published by Hinman[7] in 1915. This paper will be freely quoted. Of the urinary antiseptics in common use, hexamethylenamin is by far the best, but has very definite limitations, owing mainly to the fact that an acid medium is essential for the liberation of formaldehyd. Furthermore, "the necessity of concentration, and time for the accumulation of formaldehyd in antiseptic amounts, largely destroys the value of the drug for kidney antisepsis; for bladder antisepsis in cases with polyuria or frequent urination, except when retention in some form is present; in cases of urinary fistula, notably postoperative prostatics during the period of incontinence, and in cases with continual bladder drainage as in true incontinence or with retention catheter; and for urethral antisepsis no matter what the infection. The greatest usefulness of hexamethylenamin is in bladder prophylaxis in cases in which the above urinary conditions are not present. . . . Methylene blue, in a dilution of 1: 150,000, will inhibit the growth of staphylococci," and would therefore seem of value in this type of infection; but there has been no experimental work showing that methylene blue does not undergo modification either in the blood stream or in the urine so as to lose its antiseptic value, which will be shown below to be the case with many other compounds. Hinman states that "the value as internal urinary antiseptics of other substances such as salol, oil of sandalwood, salicylic, boric and benzoic acids, is very limited," and concludes that there is no known drug with properties even approaching those of an ideal urinary antiseptic.

As stated before, an ideal internal urinary antiseptic must be chemically stable, nontoxic, antiseptic in urine (as well as in water), and must, like phenolsulphonephthalein, possess the property of high-percentage elimination. Possibly a compound not entirely nontoxic, but relatively so, might be suitable for the purpose. Provided the renal elimination of a given compound is sufficiently rapid and complete, and that this compound causes bacterial inhibition in urine in sufficiently high dilution, it is conceivable that small doses might serve to produce urinary antisepsis, even though the compound is moderately toxic. In view of the general toxic effects on the animal organism that an antiseptic compound may be expected to have, and the possibility of injury to the renal epithelium and of irritating effects on the lower urinary tract, one realizes the hopelessness of the problem if the synthesis of a completely harmless urinary antiseptic is the goal. The matter then resolves itself into a question of relative toxicity; that is, the attainment of a compound combining minimum toxicity with maximum efficiency, so that small but effective doses may be safely used.

METHODS OF INJECTION

Each compound was investigated with two objects in view; first, to determine the rate of elimination by the kidney, and second, to determine the antiseptic properties. Rabbits were used for injection purposes because (1) they are easily available and cared for in large numbers; (2) the ear vein is easily injected, and (3) the urethra of the male rabbit is large and easily catheterized. The drugs were injected intravenously in 10 mg. amounts in 1 per cent. solution, and the rabbits catheterized after one hour. In the case of each drug a colorimetric estimation of percentage of excretion was made with the Hellige colorimeter, 10 mg. of the drug diluted in 1,000 c.c. of water being used as a standard. In order to make certain that the total excretion for one hour was quantitatively recovered, the bladders of the rabbits were irrigated after catheterization, and the irrigation added to the urine obtained through the catheter. The percentage of excretion of each compound was estimated by averaging the results of at least two injections on different rabbits. It would have been impossible to determine the rate of excretion of such a large number of compounds had it not been that nearly all of them were highly colored and hence readily detected in the urine. Colorless compounds were rejected, excepting a few in which the antiseptic tests were unusually promising.

BACTERIOLOGIC TECHNIC

Antisepsis in urine is quite a different thing from antisepsis in water. As will be shown further on and in subsequent papers, there are numerous compounds which are germicidal in high dilution in water, but which lose this property entirely when diluted in urine, and which even permit the growth of organisms in urine when in relatively strong concentration. This astonishing fact has proved to be a great obstacle. It may be readily seen that the compound, the antiseptic power of which is due to its acid or basic properties, would become inert in urine on account of the buffer[8] value of the urinary salts. Other compounds, containing ionic silver, become inert in urine because the silver is precipitated by the chlorids. There remain, however, a large number of drugs whose loss of antiseptic strength in urine is due to some unknown interfering action, the nature of which is as yet undetermined. It must not be understood that this loss of antiseptic power in urine is noted after the compound has been passed through the animal body, but it occurs when urine is added to the aqueous solution of the compound in a test tube. For this reason it became necessary to carry on parallel germicidal tests both in urine and in water.

The colon bacillus was used throughout the experiments because it is the most frequent invader of the urinary tract, and because it is resistant to antiseptics, and is readily cultivated. Investigations with other organisms are to be carried on in the future. Each compound was studied with the view of determining (1) its germicidal properties (in water and in urine) and (2) its antiseptic or inhibitory properties in urine.

1. *Germicidal Test.*—In order to rule out a large number of undesirable compounds, it was necessary to establish an arbitrary standard of germicidal strength, and compare them all with phenol (carbolic acid). The arbitrary method chosen was the determination of the highest dilution of each compound which, in

7. Hinman, Frank: Urinary Antisepsis: A Clinical and Bacteriologic Study, The Journal A. M. A., Nov. 20, 1915, p. 1769.

8. The term "buffer" action refers to the ability of mixtures of certain acid and alkaline salts in solution to maintain a practically constant hydrogen ion concentration, in spite of the addition of moderate amounts of acid or alkali. For detailed discussion, see publications of Henderson and Palmer, Clark and Lubs, and Shohl and Janney.

1 c.c. amount, will kill one loop (3 mm. internal diameter) of a twenty-four-hour broth culture of the colon bacillus, in one hour, at 37 C. Dilutions of the drug were made with sterile pipets in sterile test tubes, and all but 1 c.c. of each dilution was discarded. After the inoculation of each dilution with one loop of colon bacilli, and incubation for one hour, 0.1 c.c. of each dilution was transfered to melted agar, and plated. In transfering these 0.1 c.c. amounts, it was found convenient to use capillary pipets drawn out (from 3 mm. glass tubing) long enough to reach the bottom of the test tubes. By connecting the large end of one of these capillary tubes to a carefully calibrated small syringe (by means of a small rubber tip), it was found that 0.1 c.c. amounts could be drawn up with remarkable accuracy, irrespective of variations in the size of the capillary tubes. These tubes were used over and over again, large numbers being sterilized together by means of dry heat.

Parallel tests were run for each compound, sterile water being used for one series of dilutions and sterile urine for the other. It was found to be unnecessary to adopt any method of sterilizing the urine to be used for this purpose. Agar plates poured each day containing 0.1 c.c. of urine taken from a specimen voided in a sterile (second) flask by a normal individual were uniformly sterile. The factor of possible error due to modification of the urine through the process of sterilization was thus eliminated. For example, sterilization of urine by heat produces a marked change in the hydrogen ion concentration, the urine becoming much more alkaline.

The effect of the reaction of the urine in aiding or hindering the germicidal activity of a drug is an all-important factor. Henderson and Palmer[9] have shown that the hydrogen ion concentration of urine is normally subject to a considerable range of variation (p_H 4.8 to p_H 7.4), and that the average of this range is p_H 6.0 on the hydrogen ion scale, corresponding to 0.000001 N acid.[10] The importance of the reaction of urine when used as a culture medium has been pointed out by Shohl and Janney, who find that the colon bacillus fails to grow in urine at certain definite acid (p_H 4.8) and alkaline (p_H 9.2) end-points. In order to eliminate possible error, due to strongly acid or alkaline urine, the hydrogen ion concentration of each specimen of urine to be used for antiseptic experiments was determined, and the specimen rejected if the reaction was not approximately that of average normal urine, that is, p_H 6.0.

2. *Antiseptic Test.*—More important than the determination of the germicidal strength of these compounds was the determination of the highest dilution of each in urine that will cause an inhibition of bacterial development. For this, dilutions in urine were made in 10 c.c. amounts, sterile test tubes being used. Each tube was inoculated (as in the germicidal test) with one standard loop of a twenty-four-hour broth culture of the colon bacillus, immediately after which 0.1 c.c. of each inoculated dilution was plated, as proof that the inoculation had been made, and for the purpose of comparison with a second plate which was poured (0.1 c.c. again being transferred) after the inoculated dilutions had been incubated for twenty-four hours at 37 C. The contrasting of these two plates, poured at twenty-four hour intervals, showed whether or not growth had taken place during the incubation period. The first plate (poured immediately after inoculation) usually showed about 10,000 colonies, roughly estimated. A second (twenty-four hour) plate which was sterile or which contained very few colonies (less than 100) was considered proof of inhibition, while a plate showing countless numbers of colonies proved the absence of inhibition. In the vast majority of instances the contrast between Plates 1 and 2 was so marked that there could be no possible doubt. A daily control of inoculated drug-free urine invariably contained countless numbers of colonies in the second (twenty-four hour) plate, showing that normal urine acts as a favorable culture medium for the colon bacillus.

9. Henderson, L. J., and Palmer, W. W.: On the Intensity of Urinary Acidity in Normal and Pathological Conditoins, Jour. Biol. Chem., 1913, **13**, 393.

10. For discussions concerning the hydrogen ion concentration of urine, and the technic for colorimetric estimation, see publications of Henderson and Palmer, Clark and Lubs, and Shohl and Janney.

PHENOLSULPHONEPHTHALEIN AND SALTS

The properties of phenolsulphonephthalein itself, and of some of its metallic salts (sodium, silver, copper, mercury and barium), as illustrated in the structural formula given in Figure 1, were first investigated. Phenolsulphonephthalein, in its free acid form, although almost insoluble, is nevertheless germicidal (against the colon bacillus, according to the arbitrary standard described above) in a dilution of 1:10,000; that is, it has about fifty times the strength of phenol. In urine, however, even in almost saturated solution, phenolsulphonephthalein permits the growth and development of the colon bacillus. A suggested explanation of this loss of power is that the watery solution kills by virtue of its acidity whereas in urine the acid properties are lost on account of the buffer value of the urinary salts. Furthermore, the monosodium salt, the form used clinically, has no germicidal action even in water, and in urine permits the growth of the colon bacillus even in a 1:200 dilution. The silver salt is extremely germicidal in water (having 5,000 times the strength of phenol), but in urine the silver is precipitated by the chlorids, and the germicidal strength, due to the silver ion, is lost. The germicidal properties of the silver salt of phenolsulphonephthalein, both in water and in urine, correspond very closely to those of silver nitrate. The fact that the chlorids are responsible is shown by a similar disappearance of germicidal action when the dilutions are made in physiologic sodium chlorid solution. Furthermore, when the silver salt is injected intravenously, the ionic silver is lost in the body, and the phenolsulphonephthalein appears in the urine free from silver, probably as the sodium salt. Mercurous and mercuric salts and the cupric salt, although having some germicidal value in urine, were discarded because of their toxicity. The barium salt was quite inert.

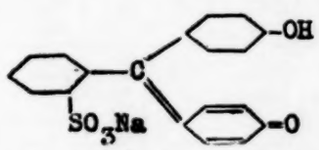

Fig. 1.—Phenolsulphonephthalein (monosodium salt).

Conclusion.—The metallic salts of phenolsulphonephthalein give no promise of value as urinary antiseptics.

SULPHONEPHTHALEINS

The compounds listed in the accompanying table are all analogous to phenolsulphonephthalein, differing from the latter compound only by the presence of various substituent groups in the phenol nucleus. All

of these compounds excepting two are practically insoluble in water, as the free acid, but are readily soluble in the form of the sodium salt. Pyrocatechinsulphonephthalein and guaiacolsulphonephthalein, however, are soluble in water without the addition of alkali. Some of these compounds are quite germicidal in water (possibly owing to excess alkali necessary to bring them into solution); but, with the exception of one only, it is a uniform rule that they lose this action when diluted in urine. Pyrocatechinsulphonephthalein, the only one to retain its value, is germicidal in urine in a dilution of 1:500, and inhibitory in urine in a dilution of 1:1,000.

Very surprising results were obtained by the injection of these compounds. Although they are all quite closely related chemically, some of them are eliminated by the kidney with the same marvelous rapidity and completeness with which phenolsulphonephthalein is eliminated, while others appear in the urine only in traces or not at all. The excretion seems to be governed by no rule. With this class of compounds, no definite relationship between chemical structure and "renal affinity" could be established. The addition of

THE EXCRETION AND THE ANTISEPTIC PROPERTIES OF THE SULPHONEPHTHALEINS

Name	Antiseptic Strength				Excretion Percentage After One Hour
	In Water		In Urine		
	Kills in One Hour	Fails in One Hour	Inhibits Development	Permits Growth	
Phenolsulphonephthalein	.....	1:200	.....	1:200	70
Thymolsulphonephthalein	1:200	1:1 000	.....	1:200	Trace
Salicylsulphonephthalein	.....	1:200	.....	1:200	Trace
Hydrochinonsulphonephthalein	.....	1:200	.....	1:200	40
Cresolsulphonephthalein	.....	1:200	.....	1:200	70
Tetra-aminophenolsulphonephthalein	1:200	1:1,000	1:200	1:500	0
Alphanaphtholsulphonephthalein	1:200	1:1,000	.....	1:200	Unstable
Orcinsulphonephthalein	.....	1:200	.....	1:200	70
Pyrocatechinsulphonephthalein	1:2.000	1:5.000	1:1,000	1:2,000	0
Tetranitrophenolsulphonephthalein	.....	1:200	.....	1:200	Hemoglobinuria
Guaiacolsulphonephthalein	1:200	1:1 000	.....	1:200	Trace
Resorcinsulphonephthalein	.....	1:200	.....	1:200	75
Pyrogallolsulphonephthalein	.....	1:200	.....	1:500	30
Phenol	1:180	1:220	1:900	1:1,000	

methyl groups to the phenol nucleus (cresolsulphonephthalein) certainly does not interfere with excretion, while excretion is prevented by isopropyl, amino and carboxyl groups, as shown by thymolsulphonephthalein, aminosulphonephthalein and salicylsulphonephthalein.

The most interesting and disappointing feature shown by the sulphonephthaleins is the effect of the addition of OH groups to the phenol nucleus. Pyrogallolsulphonephthalein, hydrochinonsulphonephthalein and pyrocatechinsulphonephthalein are all hydroxy derivatives, differing only in the number and position of the OH groups, and, of these, the pyrogallol and hydrochinon compounds are excreted, whereas pyrocatechinsulphonephthalein, the only sulphonephthalein shown to be antiseptic in urine, unfortunately, is also the only one not excreted.

Conclusions.—1. Several other sulphonephthaleins are excreted by the kidney with great rapidity, just as is phenolsulphonephthalein.

2. None of the sulphonephthaleins investigated would be of value as urinary antiseptics, since the only one showing antiseptic strength in urine fails to be excreted.

HALOGEN DERIVATIVES OF SULPHONEPHTHALEINS

To illustrate the chemical structure of the halogen derivatives of sulphonephthaleins investigated, the structural formula (Fig. 2) is given. Those investigated were tetrabromphenolsulphonephthalein, tetrachlorphenolsulphonephthalein, di-iodophenolsulphonephthalein, dibromcresolsulphonephthalein and dibromthymolsulphonephthalein. These compounds, all used in the form of the sodium salt, show moderate germicidal ability in water, probably owing to excess alkali necessary to bring them into solution; but they all become inert in urine. Furthermore, none of them excepting tetrachlorphenolsulphonephthalein are excreted, and we therefore have in compounds of this class a definite relationship between chemical structure and "renal affinity."

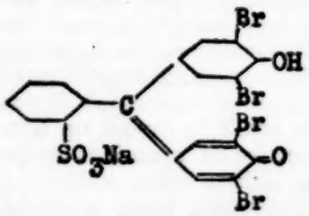

Fig. 2.—Tetrabromphenolsulphonephthalein (monosodium salt).

Conclusions.—1. Substitution of bromin in compounds of the sulphonephthalein type prevents excretion by the kidney.

2. Halogenated sulphonephthaleins give no promise of value as urinary antiseptics.

PHTHALEINS

These differ from sulphonephthaleins in that a carboxyl group replaces the sulphonic acid group, as shown in the formula (Fig. 3). Those investigated were phenolphthalein, thymolphthalein, tetrabromtetrachlorphenolphthalein, tetra-iodophenolphthalein, phenoltetrachlorphthalein and sulphonated phenolphthalein. None of these compounds were antiseptic in urine, nor were any of them excreted by the kidney, excepting the sulphonated phenolphthalein. It is interesting to note that the sulphonation of phenolphthalein gives a soluble compound (phenolphthalein sulphonic acid), the sodium salt of which is excreted almost as rapidly as is phenolsulphonephthalein. The similarity of names, however, between this compound and phenolsulphonephthalein should not give the impression that the two are the same. They differ in composition, structure and method of preparation. Since the sulphonation of phenolphthalein causes its rapid excretion, the conclusion might be drawn that the sulphonic acid group is essential for rapid elimination; but this theory is upset by the action of the following group of compounds. The sodium salt of sulphonated phenolphthalein has no antiseptic value.

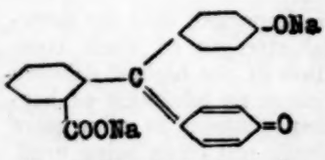

Fig. 3.—Phenolphthalein (sodium salt).

Conclusion.—The phthaleins give no promise of value as urinary antiseptics.

XANTHONES

Compounds of this class are characterized by the fact that the two phenol groups are linked together by an oxygen atom, as illustrated by the structual formula given in Figure 4. It will be seen that this formula differs from that of phenolphthalein only in the presence of an oxygen atom, although the two compounds possess divergent biologic properties. The

compounds of this class investigated were fluorescein (resorcinphthalein), sulphonefluorescein (resorcinsulphonephthalein), orcinsulphonephthalein, rhodamin and resorcinsaccharein. All of these compounds in solution are greenish and extremely fluorescent, and without exception they are excreted by the kidney with a rapidity as great as that of phenolsulphonephthalein, if not greater; the average rate of excretion for the group being 70 per cent. in one hour. Since these compounds are quite different chemically, but have one characteristic in common (the oxygen linking two phenol groups), and since they all show great "renal affinity," it is reasonable to assume that we have here a definite relationship between chemical structure and physiologic action. This class further shows that the sulphonic acid group is not essential for rapid excretion.

As germicidal agents, all four are inert excepting rhodamin, which comes very close to filling all the requirements. Rhodamin, which differs from fluorescein in that the two hydroxyl groups are replaced by amino groups, is chemically stable and nontoxic, is rapidly excreted, and kills the colon bacillus in one hour in a dilution of 1:2,000, in water; but when the compound is diluted in urine, this property is entirely lost. An investigation of the nature of this interfering action in urine has not been completed, but present experiments indicate that the loss of antiseptic power of rhodamin in urine cannot be accounted for merely by the buffer value of the urinary salts, which would tend to neutralize any acid or basic properties that a drug might possess.

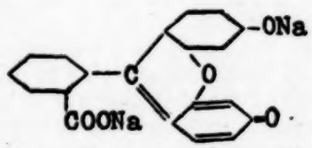

Fig. 4.—Fluorescein (sodium salt).

COMMENT

It is hoped that these experiments may call attention to the inadequacy of the urinary antiseptics in general use, and stimulate interest in the possibilities offered by synthetic chemistry. These investigations are at present being continued, and the properties of various related compounds studied, some of which are old and well known, and others of which are new compounds, synthesized so as to contain various chemical groups that have been shown to produce desired biologic properties.[11]

CONCLUSIONS

The property possessed by phenolsulphonephthalein, by virtue of which it is rapidly eliminated by the kidney, is by no means limited to this compound. Several other more or less closely related compounds show the same striking "renal affinity," and might also be of value in testing renal function were it not that phenolsulphonephathalein itself is so nearly ideal for this purpose.

Compounds of the xanthone class, that is, phthaleins (though not necessarily sulphonephthaleins) in which there is an oxygen atom linking the two phenol groups, show a similar remarkable "renal affinity."

The bromination of these compounds, both sulphonephthaleins and xanthones, interferes with their excretion.

In view of the hitherto overlooked fact that numerous actively germicidal compounds lose their strength (owing to an as yet unexplained cause) when simply diluted with urine in a test tube, the value of every drug used for the purpose of urinary antisepsis ought to be questioned until its antiseptic strength *in urine* has been experimentally demonstrated.

Since it has been possible to establish a certain relationship between chemical structure and renal excretion, and to predict, with a reasonable amount of accuracy, which drugs will and which will not be rapidly excreted; since the synthesis of germicidal compounds, very closely related to the types excreted, has been accomplished; and since one of these germicidal compounds (rhodamin) was excreted and would have been successful but for the interfering action of the urine, the problem has been shown to be worthy of further investigation.

11. In addition to the references already given, the following will be found of interest:
Clark, W. M., and Lubs, H. A.: The Colorimetric Determination of Hydrogen Ion Concentration and Its Applications in Bacteriology, Jour. Bacteriol., 1917, **2**, 1.
White, E. C., and Acree, S. F.: On the Quinone-Phenolate Theory of Indicators: The Electrical Conductivity of Solutions of Phenolsulphonephthalein and of Its Bromo and Nitro Derivatives, Jour. Am. Chem. Soc., 1917, **39**, 648.
White, E. C.: On the Quinone-Phenolate Theory of Indicators: The Reactions of Phenolsulphonephthalein and of Some of Its Derivatives, Thesis, Univ. Wisconsin, 1915.

MEDICAL JURISPRUDENCE

THE GENERAL RULES OF LAW GOVERNING THE LIABILITY OF PHYSICIANS AND SURGEONS FOR MALPRACTICE *

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A discussion of the legal liability of physicians and surgeons for malpractice of necessity encompasses a vast area. It not alone includes liability for injuries growing out of the alleged malpractice, but takes in as well liability for the acts of interns and nurses acting under instructions, and also such acts of the patient as tend to relieve the professional man of liability.

Aside from the question of negligence and want of reasonable care, which will be found more fully discussed below, the general rule now obtaining throughout the courts of the United States may be summed up briefly to hold as follows: A physician or surgeon contracts that he possesses that reasonable degree of skill, learning and experience which is ordinarily possessed by others of his profession, and that he will use reasonable and ordinary care and diligence in the treatment of the case committed to him, and that he will use his best judgment in all cases of doubt as to the best course of treatment. He is under an implied obligation when he undertakes to treat diseases or injuries to bring to his aid such obtainable remedies and appliances as discovery and experience have found to be the most appropriate and beneficial in aiding recovery. The law, however, raises no implication on the part of the surgeon to effect a cure. In other words, when a skilful and careful surgeon exercises his best judgment in a case of doubt, he cannot be held liable for a want of success. The mere fact that a patient grows worse under a physician's treatment, and becomes better when his services are dispensed with, is not evidence of malpractice.

The courts in defining the skill and care required in the treatment of a case have used such descriptive words as "proper," "reasonable," "ordinary." These words mean practically the same thing. Such care must be used as would ordinarily be regarded as

* The large majority of the statements made in this article are not the writer's opinions, but are based on decisions of the higher courts.

proper under the circumstances of the case. It is interesting to note that a surgeon is not liable for want of the *highest* degree of skill. Nor is a physician *ipso facto* liable by virtue of the fact that his mode of treatment is not the best that might have been adopted; he is only required to exercise reasonable skill, taking into account the advancement of professional learning.

What constitutes reasonable care and skill must be determined in each case from the circumstances. A leading Connecticut decision holds that to render the physician liable, the negligence need not be great and gross, but a want of ordinary diligence, care and skill is sufficient. This important ruling has been followed in a New York opinion by the Court of Appeals. In determining what constitutes the reasonable and ordinary skill and diligence, which it is the duty of a physician to possess and exercise, the test is the degree of skill and diligence which other physicians in the same general neighborhood and in the same general line of practice ordinarily have and practice.

In estimating the damages that a patient has sustained, when malpractice has been established, the jury is permitted to take into consideration the additional pain and suffering that the patient has suffered, but *not* the suffering caused by the original injury. The patient in establishing malpractice must show, not only that the physician was negligent or unskilful, but also that the injury resulted from such negligence or unskilfulness. The injured person is not bound to seek aid from other physicians to mitigate the consequences of the mistake of the attending physician.

As to the obligation of a physician to continue to attend a patient once under his care, the generally accepted doctrine is well put in a Maine decision which holds that a physician who leaves a patient at a critical stage of the disease without reason or sufficient notice to enable him to procure another medical attendant, is guilty of culpable dereliction of duty. This rule has been still more drastically drawn in some cases wherein it has been held that the physician must judge at his peril as to when it is safe to discontinue treatment, in the absence of consent by the patient to its discontinuance or reasonable notice to procure other attendance.

When a physician engages to attend a patient without limitation of time, he cannot cease his visits except, first, with the consent of the patient, or, secondly, on giving the patient timely notice so that he may employ another physician, or, thirdly, when the condition of the patient is such as no longer to require medical treatment; and of that condition, the physician must judge at his peril. When a physician is called in generally without limitation, the presumption is that his service is under an implied engagement to attend the patient through the illness, or until his services are dispensed with; but when the patient comes to the office of the physician from whom he receives proper treatment, and then fails to return for further treatment, in consequence of which he suffers injury, he is not entitled to maintain an action against the physician for such injury, because it is the result of his own default and misfeasance.

When a physician sends another physician, who is in independent practice, to attend a patient, he is not liable for injuries sustained by the patient if the injury results from the negligence of the other physician, and this is so notwithstanding his promise to attend the patient personally.

Various rules have been propounded by our courts in determining the medical man's liability for errors of judgment. The best summary of this branch of the law, in the writer's opinion, is to be found in the following words, used by the Colorado courts:

> When there are reasonable grounds for doubt and difference of opinion, the professional man, after the exercise of his best judgment, admitting that he possesses the necessary knowledge, is not responsible for errors of judgment or mistakes, and is only chargeable with error where such error could not have arisen except from want of, or the exercise of, reasonable skill and diligence.

The attention of medical men should be directed to the so-called rule against trying experiments. It would appear from this doctrine of law that any advancement in the profession must be at the personal risk of the physician rather than of the patient. Thus, any deviation from the established mode of practice is sufficient to charge the surgeon in case of any injury arising to the patient.

If the settled practice of the profession allows but one course of treatment in the case, any departure from such course may properly be regarded as the result of want of knowledge, skill and experience or attention. In other words, when a particular mode of treatment is upheld by the consensus of opinion among the members of the medical profession, it should be followed by the ordinary practitioner; and if he sees fit to experiment with some other mode, he does so at his peril. This leads us to two conclusions as a matter of law: (*a*) A physician may not try experiments with his patients to their injury, and (*b*) the established treatment must be followed. The only limitation applying to this rule is that the acts and skill of the physician are to be judged by the school of practice to which he belongs. He must come up at least to the average standard of the school of practice to which he professes to adhere.

When a patient charges a physician with injuries resulting from improper or negligent treatment, he assumes the burden of proof. He must accordingly prove to the satisfaction of the court or jury, as the case may be, by a fair preponderance of the credible evidence, that the physician did not exercise ordinary skill and care.

The old decisions occasionally distinguished between the liability of medical men for malpractice toward patients who paid for the services rendered, and those for whom the services were gratuitously performed. It may be stated, as a fair deduction from recent authorities, that this distinction no longer exists. The generally accepted rule in the courts today holds that the law requires the same degree of care of a surgeon when his services are gratuitous as when he receives compensation therefor.

In an action for malpractice, the physician's reputation for skill and learning will not avail him as a defense. The question in issue is the degree of care and skill in a particular given case. Reputation does not affect the treatment of the case in litigation. This rule, however, works conversely to hold that evidence of a reputation for negligence and unskilfulness as well as prior actions for malpractice will not avail to establish or aid the patient's case.

It goes, of course, without saying, that on the trial of an action for malpractice, the question as to whether the physician has or has not acted negligently or unskilfully is a question of fact, not one of law, and therefore determinable by the jury.

The generally accepted doctrine today holds that an action against a physician or surgeon for malpractice does not survive his death. There, have, however, been exceptions to this rule in some of the states.

Considerable discussion and litigation have arisen out of the question of the liability of a surgeon for performing a surgical operation without the consent of the patient. The law thus far established is that a physician is liable for operating on a patient, unless he obtains the consent either of the patient, if competent to give such consent, or if not, of some one who, under such circumstances, would be legally authorized to give the requisite consent. In certain instances consent will be presumed unless the person operated on has been the victim of false or fraudulent representations, or has been deliberately deceived. We may take it as established by no mean authorities that, except in cases in which the consent is express or implied by circumstances, and occasions other than a mere general retainer for medical examination and treatment, and except also when there is a superior authority which can legally and rightfully dispose of the person of the patient, and which gives consent, a surgeon has no right to violate the person of a patient by a serious major operation, or one removing an important part of the body. A surgeon, however, is not liable for failure to procure the consent of a husband to a surgical operation on his wife, if the wife herself consents to it, and it is immaterial that the operation involves the removal of the wife's ovaries, which will deprive the husband of offspring.

While it is practically conceded by all the cases that it is competent for a physician or surgeon in an action for malpractice to prove negligence of the patient, or of another whose negligence is chargeable to him, directly and proximately contributing to the injury, there is some confusion among the cases as to whether the effect of such negligence is to bar a recovery altogether, or merely to mitigate or reduce the damages. There are three different aspects in which the question of the effect of negligence of the patient himself, or of a third person whose negligence is chargeable to him, may arise:

(*a*) When it appears that there was no breach of duty on the part of the physician or surgeon, and that the injury was due entirely to the patient's negligence. In such a case it is clear that there can be no recovery at all.

(*b*) When it appears that there was a breach of duty on the part of the physician or surgeon, but that the breach in and of itself would not have resulted in substantial injury to the patient, and when the patient's own negligence has aggravated the physician's breach, the two acts jointly causing serious injury to the patient. In these cases it is very generally held that there may be no recovery, as the patient's negligence, though of a lesser degree than the physician's, is the proximate cause of the injury.

(*c*) When it appears that there was a breach of duty on the part of the physician or surgeon, which alone would have resulted in serious injury to the patient, but which has been aggravated by the patient's own negligence. In these cases the patient may recover from the physician, but the patient's negligence may be set up in mitigating the damages recoverable.

As a hand rule for measuring the rights of a patient who has been guilty of contributory negligence, it may be briefly stated that to preclude a recovery, the patient's own negligence or improper conduct must have contributed substantially to produce the injury.

The question as to the liability of a surgeon for the negligence of an intern attached to the hospital in which the former performs an operation was presented for the first time to the courts of the United States in a case entitled *Harris* v. *Fall,* decided in January, 1910, by the Circuit Court of the United States, for the Northern District of Illinois. The language of the court in its opinion is not very clear, and the sole deduction to be made therefrom is that the contract of a surgeon undertaking to perform an operation in a general hospital does not imply liability for mistakes in care, dressings and treatments given by the hospital attendants, *during convalescence after the operation is finished.* The question of the surgeon's liability for the negligence of interns or nurses *during* the operation was not decided by the court. In another decision it was held that the surgeons of a hospital were not liable for the negligence of the nurses in scalding a patient in a hot bath prescribed by the surgeons, when the latter were not near enough to be aware of the negligent act and to prevent it. The nurse herself, of course, would be liable if a proper case of negligence should be made out. In a Massachusetts case, the rule was flatly laid down that a surgeon is not responsible for the negligence of hospital nurses in attending a patient after a surgical operation. As to the liability of the hospital for the negligence of its nurses or attendants, this doctrine rests on the general foundation that a master is responsible for the torts of his servants, within the scope of their employment. A hospital that is a public charitable institution is generally relieved from liability.

There are many and various technical rules of procedure in litigations for malpractice, including questions of pleading and evidence, that have not been touched on in this article, which deals mainly with questions of substantive law. Two questions of technical procedure, however, are noteworthy and should be brought to the reader's attention.

1. The great majority of the states have statutory provisions providing that communications between physicians and patients as to professional matters are privileged and not subject to testimony in court, without express waiver. The general doctrine governing the right of a plaintiff in an action for malpractice to avail himself of privilege, as against testimony of the defendant or other physicians, holds that testimony on behalf of the patient in an action brought by himself against his physician operates as a waiver of his privilege, both as to the physician himself and to others called in consultation with him, but not as to physicians independently employed—unless, it may be, the patient testifies as to his communications to the latter.

2. The question is in some doubt as to whether the recovery of his fees by a physician in an action brought for that purpose is a bar to a subsequent action brought by the patient for malpractice.

The New York decisions generally hold that a recovery by the physician acts as a bar; but there are numerous sound authorities to the effect that, the question of malpractice not having been litigated in the action for fees, the patient is free to pursue such an action. The latter rule is the sounder, in my opinion, but the question is one which depends on the jurisdiction in which the action is brought and the questions presented on the previous litigation.

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TRICHINOSIS

A REPORT OF THREE CASES SIMULATING MENINGITIS, WITH THE FINDINGS OF TRICHINA LARVAE IN SPINAL FLUID *

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Since Van Cott and Lintz[1] first reported the findings of trichinae in the spinal fluid, there have been reports by Bloch,[2] Elliott,[3] Lintz,[4] Cummins and Carson,[5] and Salzer[6] confirming the observation. These reports do not emphasize the occurrence of meningeal symptoms. Bloch particularly emphasizes the presence of trichinae in the spinal fluid without any symptoms referable to the brain and cord. He says, however, that "the presence of a positive Nonne and Noguchi would indicate meningeal irritation." Elliott mentions a positive Kernig sign, but asserts it is a false Kernig and one due to pain. Bloch and Hassin[7] report a case of trichinosis in a young man, who developed a left-sided hemiparesis, and showed exaggerated knee jerks, a bilateral Babinski reflex, and left-sided ankle clonics. No trichinae were found in the spinal fluid. The following cases are reported because of the definite meningeal symptoms, the changes in the spinal fluid, and the difficulties encountered in early diagnosis.

At the Cook County Hospital, all patients enter the receiving ward, where an examining physician makes a diagnosis. The patient is then sent to the proper ward. In the three cases herein reported, the patients entered the contagious disease hospital, Jan. 4, 1918, with an examining-room diagnosis of epidemic meningitis. The three are members of the same family. No history was obtainable, except from the oldest girl, who is about 12 years of age.

REPORT OF CASES

Case 1.—S. P., girl, aged 6 years, was sick six days with headache and vomiting. There was no diarrhea and no abdominal distress. The patient, an Italian child, was brought to the ward in an irrational state. The striking feature of the case was marked irritability, in spite of which, the child responded when told to show her teeth, put out her tongue, etc. There was a marked edema of both upper eyelids. The temperature on admission was 100.1 F., the pulse was 112 and the respiration, 24. There was a definite rigidity of the neck, and when the child was lifted by the head, she cried. Photophobia was present. There were a few crusts on the nose but no herpes on the lips. The heart and lungs were normal. There was no tenderness, but an uncertain degree of general rigidity about the abdomen. The liver was negative and the spleen was not palpable. There was tenderness over the extremities. The Kernig sign was strongly positive. The knee jerks were absent and there was no Brudzinski's sign. The spinal fluid was under increased pressure, was clear and showed 58 cells per cubic millimeter; the Nonne reaction was positive and Ross-Jones' test, negative. Haines solution was reduced. The presence of lymphocytes was observed, but there were no organisms. On the basis of these findings, a diagnosis was made as follows: The clinical manifestations of the patient pointed to a definite meningitis. The character of the spinal fluid, together with the absence of knee jerks, pointed to a poliomyelitis, although there was no evidence of paralysis.

The next day, the child was extremely sick. Her temperature was 103, and her pulse, 96. The Brudzinski and the Kernig signs were positive. There was an edema of the legs and the eyes, as well as marked tenderness over the extremities, particularly over the right elbow when held in a position of flexion. The blood count revealed a leukocytosis of 8,000, and an eosinophilia of 10 per cent. Spinal puncture was repeated and revealed fifty cells which were lymphocytes. The fluid was under increased pressure. Trichinae were found, two or three in a field. The Nonne reaction was positive and Ross-Jones' test, negative. Haines solution was reduced. A section of muscle removed from the biceps on the same day showed unencapsulated trichinae. Blood was removed, Jan. 10, 1918, from a vein in the elbow, and examination was delayed until Jan. 14, 1918. It was examined according to the technic of Herrick and Janeway, and many trichina larvae were found. The blood count, January 11, revealed a leukocytosis of 11,000 and an eosinophilia of 8 per cent. As the patient was observed, the edema of the eyelids and the legs grew less, and muscular tenderness was definitely localized; but stiffness of the neck persisted, as well as the Kernig and the Brudzinski signs. The patient was transferred to the Children's Hospital.

Case 2.—D. P., boy, aged 8 years, who had been sick four days, was admitted to the hospital, Jan. 4, 1918. He was a brother of the child described in the foregoing. He was unable to rise and looked sick. His face was swollen, particularly about the eyelids. His older sister said he had been sick for four days with headache and vomiting. The temperature on admission was 101.8; pulse, 110 and the respiration, 28. The head was large and square. There was a marked edema of the upper eyelids, particularly of the left, which almost closed the eye. There was a herpetic sore on the upper lip. The throat was congested. The heart and the lungs were normal. The abdomen was not tender, but there was a degree of general rigidity present. Neither the liver nor the spleen was palpable. In both axillae, there were numerous small pinpoint hyperemic spots, which tended to fade on pressure. Both the upper and the lower extremities were tender to touch. There was an infected vaccination mark over the left upper extremity. The Kernig sign was strongly positive and the knee jerks exaggerated. The Babinski reflex was doubtful. A spinal puncture was made, and the spinal fluid was under increased pressure, being clear and showing fifty cells per cubic millimeter. The presence of lymphocytes was observed. The Nonne reaction was positive and Ross-Jones' test, negative. Haines solution was reduced. A diagnosis, as in the former case, was made as follows: The physical findings were very suggestive of a meningeal inflammation or irritation, but the etiologic factor was uncertain. Vigorous catharsis was then ordered. Two days later, the patient had definite soreness of the muscles and edema of the legs and the eyes. The blood count revealed a leukocytosis of 30,000 and eosinophilia of 50 per cent. Repeated blood counts revealed a leukocytosis of 15,000 and an eosinophilia of 15 per cent. Another differential revealed an eosinophilia of 24 per cent. The boy improved rapidly. Another special puncture was made two days after admission, but was bloody (traumatic). The blood was examined for trichinae, but none were found. No examination of the muscle was made.

Case 3.—T. P., girl, aged 12, was the oldest of the three children brought to the ward with a diagnosis of meningitis. She said she had been sick for about two days, complaining only of headache and stiffness of the neck. There was no other history. She did not appear very sick. The temperature was 100.8, and the pulse, 88. The head was negative and eyes were watery as if she had been crying. Both eyelids were swollen and edematous. There was no photophobia.

* From the Contagious Hospital of Cook County Hospital.

1. Van Cott, J. M., and Lintz, William: Trichinosis, The Journal A. M. A., Feb. 28, 1914, p. 680.
2. Bloch, Leon: Trichinosis; Report of a Case with the Trichina Larvae in the Spinal Fluid, The Journal A. M. A., Dec. 18, 1915, p. 2140.
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4. Lintz, William: Trichinosis and the Cerebrospinal Fluid, The Journal A. M. A., June 10, 1916, p. 1856.
5. Cummins, W. T., and Carson, G. R.: A Case of Trichinosis with Embryo in the Spinal Fluid, The Journal A. M. A., June 10, 1916, p. 1856.
6. Salzer, B. F.: A Study of an Epidemic of Fourteen Cases of Trichinosis with Cures by Serum Therapy, The Journal A. M. A., Aug. 19, 1916, p. 579.
7. Bloch, Leon, and Hassin, G. B.: Med. Rec., New York, 1917, 91, 537.

Herpes were present on upper lip. There was a small amount of rigidity of the muscle of the neck, which was apparently not voluntary. The heart and the lungs were apparently normal. The abdomen revealed a slight tenderness in the region of the spleen, but the spleen was not palpable. There was a slight rigidity of the abdomen. There was no pain or tenderness over the extremities, except in the left elbow joint, but it was difficult to localize pain definitely. No evidence of any paralysis was discovered.

The Kernig sign was positive, both knee jerks were absent, and the Brudzinski sign was negative. Forty c.c. of the spinal fluid were removed. It was under increased pressure, was clear, and showed 240 cells per cubic millimeter, and lymphocytes. The Ross-Jones test was negative and the Nonne reaction positive.

The findings present were suggestive of a meningitis. The character of the spinal fluid, on the contrary, suggested poliomyelitis, which diagnosis was further supported by the absence of knee jerks and pain in the region of the elbow.

Jan. 5, 1918, there was no change. The Kernig sign was positive and there was a suggestion of Brudzinski's sign. The throat was congested. The skin of the abdomen revealed a few red pinpoint areas, not petechial, and unlike rose spots, which fade on pressure. There was pain in the region of the elbow anteriorly and not over the joint. The rigidity of the neck was only moderate.

January 6, there was headache with pain in the legs, arms and back. The patient had difficulty in sitting up, and in elevating the right arm. There was no evidence of paralysis. Knee jerks were now present but were hard to elicit. The Kernig sign persisted. The blood count revealed a leukocytosis of 10,800, and an eosinophilia of 8 per cent.

January 7, the patient was very sick, with a temperature of 103 and a pulse of 110. A spinal puncture was made. The spinal fluid was under increased pressure, and the first portion was bloody. When it was examined, actively motile ous trichinae were found.

January 11, the spinal puncture was repeated. The fluid was clear, was under increased pressure, and showed eighty cells per cubic millimeter, as well as the presence of lymphocytes. Trichina larvae were present. The Nonne reaction was positive and the Ross-Jones test negative. The Haines solution was reduced. The nitric acid test for albumin was negative. The biceps muscle was harpooned, and actively motile trichinae were found. The blood examination was made according to Herrick and Janeway technic, and numerour trichinae were found.

No history of the eating of ham, pork or pork sausage was elicited from the children or parents. Subsequently the mother was admitted to the medical ward of the hospital, and gave a good diarrheal history, but no trichinae were found in the muscles.

COMMENT

If we analyze the foregoing it will be observed that we are dealing with three cases showing distinct meningeal symptoms. Also in two of these, the spinal fluid containing the trichina larvae showed marked cellular increase. Van Cott and Lintz,[1] Bloch[2] and others have suggested the possibility of meningeal irritation due to the presence of trichinae in the spinal fluid. None of the previous reports mention any increased cell count. Van Cott and Lintz[1] observed a moderate increase in pressure, as well as a gray sediment on standing. The centrifuged specimen showed a number of lymphocytes and failed to reduce Fehling's solution.

Elliott[3] counted 3 cells per cubic millimeter. Cummins and Carson report a count of 3 cells. Lintz[4] reports an occasional lymphocyte and failure to reduce Benedict's solution in three cases.

The spinal fluid in our cases, as already noted, was clear and under increased pressure. The cell count was as high as 240 and as low as 40 per cubic millimeter. The Nome reaction was positive, the Ross-Jones' test was negative, and Haines solution was reduced. The nitric acid test for albumin was negative. We consider this as definite evidence of meningeal irritation. Our record shows a similar evidence in Case No. 2, in which no trichinae were found in the spinal fluid. It is unlikely that the toxemia associated would cause these changes, and there is a possibility that the trichinae were overlooked in the examination of the spinal fluid. That the meningeal symptoms are very likely due to meningeal irritation is in accord with definite changes in the spinal fluid, so that two of the cases might be called meningitis due to trichina. While it is true that a Kernig sign may be due to muscular swelling and edema, nevertheless the Kernig sign in these cases was present before the edema developed. The edema noted was not similar to the ordinary type, which pits on pressure, but was rather hard, glistening and boardlike, particularly over the extremities. Granting a false Kernig sign, on what basis other than meningeal irritation are we to explain the stiff neck, the suggestive Brudzinski sign, the exaggerated knee jerk (in one case), and the headache and vomiting, unless the cause could possibly be the toxemia? But toxemia cannot account for the cellular change in the spinal fluid.

I wish to call attention to the necessity of differentiating these early cases with meningeal symptoms from poliomyelitis. Van Cott and Lintz state that "in children marked weakness of the limbs is present," and report one case in a child of 8 years, in whom locomotion was difficult because of the great prostration. In Case 2, the patient was unable to arise on the examining-room table and stand, unless supported. In the other two cases, the patellar reflexes were absent. In addition, tenderness was present over the extremities, and patients complained of pain on pressure. In children, it is at times difficult to determine whether one is dealing with a perineuritis or a myositis, as the pain response is very readily obtained. When, in addition to these factors, a physician examines the spinal fluid, and finds it clear, under increased pressure, and observes a cell count ranging from 240 to 40, he may justly suspect poliomyelitis in the absence of any evidence of paralysis. The diagnosis of trichinosis, however, is established by the occurrences of edema, the presence of an eosinophilia in the blood picture, and the isolation of the trichinae from the spinal fluid or muscle.

The high eosinophilia of 50 per cent., in Case 2, and the comparatively low eosinophilia in the other two children, who were extremely ill, is in accord with the observations of Opie,[8] to the effect that the more severe the infection the lower the eosinophilia, and vice versa. In this connection I should also like to make the following observations:

In Case 3 the patient, who was the oldest of the three, developed an urticaria. By many physicians urticaria is considered an anaphylactic reaction. It is known that in the postanaphylactic stage there is an increase in eosinophilia (Herrick[9]). Accordingly, a differential count was made when the urticaria first appeared, and was found to be 12 per cent. Twenty-four hours later it was 10 per cent.

SUMMARY

1. Trichinae in the spinal fluid in two cases produced definite clinical symptoms of meningitis.

8. Opie, E. L.: Am. Jour. Med. Sc., 1904, **127**, 217, 477.
9. Herrick, W. W.: Experimental Eosinophilia with an Extract of an Animal Parasite, Arch. Int. Med., February, 1913, p. 165.

2. The spinal fluid in trichinosis, in addition to the trichinae, showed an increase in lymphocytes, from 240 to 40 per cubic millimeter, reduced the Haines solution, and gave a positive Ross-Jones test.

3. Trichinosis with meningeal irritation must be differentiated from poliomyelitis.

THE DREYER METHOD OF AGGLUTINATION

AS USED AT THE ARMY MEDICAL SCHOOL*

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That agglutination tests, made after typhoid and paratyphoid vaccination or after the diseases themselves, may have uniformity and comparable values, the following technic, a slight modification of that of Dreyer,[1] is offered.

The method consists simply of macroscopic agglutination tests on varying dilutions of serum, using a killed culture of *B. typhosus* or *B. paratyphosus* A or B, the agglutinability of which has been determined by titration against a given standard, established by the Department of Pathology, University of Oxford.

The necessary apparatus is readily available, and consists of a Wright's capsule, for securing blood; about thirty small test tubes, chemically clean, but not necessarily sterile; one 1 c.c. pipet, graduated in tenths, such as used in Wassermann work; one 2 c.c. pipet for making the dilutions; a few ounces of physiologic sodium chlorid solution, not necessarily sterile; and a quantity of the standard culture. By comparison with this standard culture, a new supply may be made for extended work.

The technic for the test is quite simple. Sufficient blood is taken in the capsule to yield 0.3 c.c. of serum. This amount is withdrawn in a pipet and transferred to the first tube. This tube has previously received 2.7 c.c. of saline solution, while the following nine tubes have each received 1.5 c.c. of saline solution. Of this first 1:10 dilution of serum, 1.5 c.c. are carried into the second tube, mixed thoroughly, and 1.5 c.c. of this 1:20 dilution is carried forward. This procedure is carried out through the series of ten tubes, the last 1.5 c.c. being discarded. Beginning in the weaker dilution, the diluted serums are each divided into three tubes, each tube containing 0.5 c.c. of the serum dilution. The tube rack then contains three series of ten tubes containing serum dilutions ranging from 1:10 to 1:5,120.

To each tube in the first series, 0.75 c.c. of the standard culture of *B. typhosus* is added; to each tube of the second series, 0.75 c.c. of the standard culture of *B. paratyphosus* A is added; and to each tube of the third series, a like amount of the culture of *B. paratyphosus* B is added. The tubes are then thoroughly shaken.

The tubes are then placed in a water bath at from 50 to 55 C. for two hours; are removed and cooled for fifteen minutes, and are then read. The highest dilution showing agglutination, without sedimentation visible to the naked eye, gives the reading. The dilution of the serum in this tube, divided by the factor of agglutinability of the culture used, gives a final reading expressed in the number of agglutinin units per cubic centimeter of the serum. (It must be kept in mind that the addition of the culture has increased the dilution of the serum one and a half times, the first tube representing a dilution of 1:25, the last a dilution of 1:12,800.) These readings are comparable with each other, whenever the same technic has been used, and a standard agglutinable culture has been used.

If it becomes necessary to make up a new supply of the standard agglutinable culture of *B. typhosus*, the procedure is as follows: *B. typhosus* is subcultured daily in broth, for about ten days, to increase its agglutinability and reduce its auto-agglutinability. Finally it is planted in broth in partly filled flasks and incubated twenty-four hours. At the end of that time, 0.1 per cent. formaldehyd solution (full strength) is added, it is placed in an ice box for four or five days, and it is shaken repeatedly. The then sterile culture is ready to be standardized for (1) opacity and (2) agglutinability.

To standardize for opacity, two series of fifteen tubes each (tubes of equal size and of clear glass) are set up, and varying dilutions of standard culture in one series, and the culture under standardization in the other, are made in accordance with the accompanying schedule.

DILUTIONS

Culture—														
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
Physiologic sodium chlorid solution—														
1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.8	0.6	0.4	0.2	0.0

A tube from one series, chosen at random, is matched for opacity with the tubes in the other series. The dilution of each culture in these tubes is noted. This procedure is repeated six times and the average taken. The necessary dilution of the new culture is thus determined, the dilution to be made with physiologic sodium chlorid solution, to which has been added 0.1 per cent. formaldehyd solution. It is then to be bottled and kept in the ice box.

To standardize for agglutinability, an immune serum is procured. A rabbit immune serum of known agglutinin unit content is to be preferred, though human serum, taken soon after inoculation, serves the purpose. The agglutinating serum is set up in two parallel series, in varying dilutions, the variations not to be excessive. To one series the standard culture is added, to the other the culture under standardization. These tubes are then shaken, incubated at 55 C. for two hours and read for the highest dilutions showing agglutination visible to the naked eye. That dilution in the known culture is to that dilution in the new culture as the factor of the known culture is to x (the factor of the new culture).

This method is, of course, similarly applicable to the *B. paratyphosus* A and B. It is also applicable to the three strains of *B. dysenteriae* and *B. coli*, though in the latter cases, at the Army Medical School, it was necessary to establish our own standard.

The foregoing method is an ideal one for the Gruber-Widal method for the diagnosis of typhoid or paratyphoid fever in the uninoculated, and is the best method for following the resistance of the patient as expressed in agglutinin units. For the quantitative determination of antibodies produced after Army triple typhoid vaccine, it offers the only simple and practicable method that will yield results that are comparable not only within themselves, but also with the results of other workers in the same field.

For the diagnosis of typhoid or paratyphoid fever in patients previously inoculated with the Army triple typhoid vaccine, it offers a valuable adjunct to the cultivation of the organism from the blood or the stool, for it has been found that by this method, though a positive Widal exists, owing to a previous inoculation, quantitative fluctuations of the agglutinin content are indicative of active infection.

Cultures of the three types of pneumococci and of four strains of meningococci are being used at the Army Medical School in an effort to procure comparable results in determining the antibodies produced after protective inoculations. It has been found necessary to heat these cultures, in addition to the formaldehyd solution, particularly in the case of the meningococcus, to prevent autolysis.

* From the Department of Pathology, Army Medical School.

1. Dreyer, G., and Torrens, J. A.: Lancet, London, 1915, **2**, 1369.

A few suggestions may facilitate work along this line. Readings should always be made under constant lighting conditions. Bacterial count may be substituted for standardization by opacity. One-tenth per cent. formaldehyd solution kills bacteria, but not fungi. If work is to be done intermittently, it is best to bottle the culture in small bottles, for preservation, since contamination by fungi is common. For routine work, large bottles, from which the daily amount is removed under aseptic conditions, yield best results. Under proper storage conditions (a dark ice chest), the factor *of* agglutinability does not change in six months, and probably continues the same for a much longer period of time.

THE URINARY TRACT IN PULMONARY TUBERCULOSIS

A REPORT OF THE STUDY OF SIX HUNDRED CASES

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For years we have had forced on our attention, at frequent intervals, the question of the relative value of surgical and medical treatment of tuberculosis of the kidney, and of the true significance of the various symptoms and signs on the presence or absence of which the diagnosis of this condition is made. We frequently see patients who apply for relief of advanced tuberculosis of the second kidney, very shortly after the first kidney had been removed for tuberculous involvement. In the Sea View Hospital alone, since 1913, we have seen at least twenty-five such patients who were admitted within eight to twelve weeks after the nephrectomy.

This problem cannot be dismissed with the statement that "a kidney which is practically destroyed and which acts as a focus for dissemination of the disease, and the toxins generated in which irritate the second kidney during their elimination, should be removed—the second kidney being in good condition," nor that "a kidney which contains the sole active focus of tuberculosis in the body should be removed to prevent dissemination of the disease." The fact remains that in the cases of renal tuberculosis in which nephrectomy is done, the large majority of primary deaths are due to inability of the remaining kidney, and the secondary death rate is high.

It seems to us that the most important points to settle in considering the relative values of the surgical and the medical treatment of this condition are, "Do we judge correctly the significance of the symptoms and signs we attribute to it?" and "Do we read aright the results we obtain with the precise methods of examination of the urinary organs which are now at our command?" In other words, do we operate in some cases which had best be let alone, because of misconception of the significance of these symptoms and signs?

To get more light on this perplexing subject, we have carefully observed at the Sea View Hospital a series of 600 cases of tuberculosis, and have studied the relation of the urinary organs to tuberculosis of the body in general, the presence and absence of symptoms referred to the genito-urinary organs and their significance, and the presence and absence of signs referred to these organs and their significance.

The series under consideration differs from some of the groups of cases previously observed and reported by others, in that this series consists entirely of cases not unlike those which the physician and surgeon meet in everyday practice, rather than of necropsy findings in those who have succumbed to the tuberculosis, and in whom, naturally, the disease had made more extensive ravages. This will explain the more favorable findings—the considerably smaller percentage of complications in the genito-urinary organs found in this series than in those of other observers. The patients under observation were 386 men and 214 women—all adults.

Because of:

1. The difficulty in demonstrating the tubercle bacilli in the urine; and
2. When the bacilli are found, the difficulty of diagnosing the seat of the focus in the urinary tract, whether it is:
   (*A*) in one kidney or the other, in the ureter, bladder, or in the prostatic urethra;
   (*B*) if foci were present in several of these organs, or
   (*C*) whether no tuberculous lesions were present or demonstrable in any of the urinary organs in spite of
      (*a*) the urine containing tubercle bacilli, or
      (*b*) of the presence of subjective symptoms referred to the genito-urinary tract or of both,

the following careful routine was observed, and the following results noted:

1. A note was made of all patients who gave a history of subjective symptoms referable to the genito-urinary tract, such as nocturnal and diurnal frequency of urination, tenesmus, etc. These numbered sixty-three (10.5 per cent. of the total).

2. A twenty-four hour specimen of urine of each of the 600 patients under observation was examined by the usual routine method, and a separate search was made for acid-fast bacilli.

3. In all patients whose urine showed acid-fast bacilli, the bladder urine was drawn by catheter under rigid aseptic precautions, to guard against contamination of the urine by smegma bacilli, which are also acid fast and otherwise resemble, morphologically, the tubercle bacillus, and which are often found in the anterior urethra in the male and are very commonly present on the external genitals of the female.

The following reports of observations as to the frequency with which the smegma bacilli are met about the urogenital organs are cited to show the necessity of such precautions: Young and Churchman[1] took smears from the fossa navicularis in twenty-four patients, and found the smegma bacilli in eleven (46 per cent.). Brereton and Smith[2] examined two series of cases with the following results: In 126 insane patients, red-stained bacilli were found in eighty-five (67.5 per cent.) after the smears were decolorized with 25 per cent. sulphuric acid. After being counterstained with methylene blue, which stains smegma bacilli but not the tubercle bacilli, only nineteen of these smears (22 per cent.) were found to

1. Young and Churchman: Am. Jour. Med. Sc., 1905, **130**, 52.
2. Brereton and Smith: Am. Jour. Med. Sc., 1914, **148**, 267.

contain red-stained bacilli. The second series consisted of twenty patients. In these, red-stained bacilli were found in thirteen (65 per cent.) after decolorization of the smears with 25 per cent. sulphuric acid, and in only two (10 per cent.) after the smears had been counterstained with methylene blue. Brereton and Smith question whether true smegma bacilli have ever been cultivated, and until a satisfactory method has been discovered for cultivation of the true smegma bacilli, we believe it is useless to base any diagnostic value on a procedure that depends on their growth.

4. Samples of ninety-one urines that showed the presence of acid-fast bacilli were sedimented and injected into guinea-pigs. A positive result was obtained in only twenty-three cases (25 per cent.). This is a much smaller percentage for the total number of cases studied than was found by other observers, being only one in twenty-seven cases as compared to one in eleven found by Cunningham and one in ten found by Bernstein.

5. A searching cystoscopic examination of the bladder, the trigon and the ureteral orifices was made in the sixty-three patients who presented subjective symptoms referable to the genito-urinary tract, as well as in such other patients as would consent to it. In those patients whose catheterized bladder urine showed acid-fast bacilli, the ureters were catheterized (when that was possible) for further examination of the urine from the individual kidneys. In view of the interesting results obtained, it is unfortunate that many of those who had no subjective symptoms referable to the urinary tract refused cystoscopic examination and ureteral catheterization.

6. The genital organs of the 386 men patients showed the following associated tuberculous lesions: twenty-three tuberculous prostates, eleven tuberculous seminal vesicles, and sixteen tuberculous epididymides.

7. In a number of cases, tests of the kidney function were made, to note the effect of tuberculosis of the kidney on its function. In this series, the phlorizin glycosuria test (which we find to be as reliable as any, in all except diabetic patients) was made.

RESULTS OBTAINED

Routine examination of the urine was made of 449 patients whose urinary organs were negative to any form of perceptible tuberculous involvement or to subjective symptoms. In 220 the urine was normal, and in 229 the urine showed some albumin, casts, etc.

The presence of tubercle bacilli was by no means limited to such urines as showed apparently damaged organs. Of fifty cases in which the presence of the bacilli was the only indication of tuberculosis in the urinary tract, in twenty-six the urine was otherwise negative, and in twenty-four it showed albumin, casts, etc.

The 151 cases which showed some other abnormality than simple chronic nephritis, were divided into two main groups: Group A, consisting of ninety-one patients, showing the presence, microscopically, of tubercle bacilli in the urine, and Group B, sixty cases in whose urine repeated microscopic examination failed to show the presence of the tubercle bacillus.

Animal inoculation with sedimented urine from the ninety-one patients of Group A proved positive in only twenty-three. Among the sixty patients of Group B were found two whose urines proved positive on animal inoculation.

The number that gave subjective symptoms referable to the urinary tract was sixty-three. A careful cystoscopic examination of these sixty-three cases showed rather surprising results: Twenty-three showed bladder lesions; forty showed no bladder lesions on the most careful scrutiny. Of the forty, twenty-three presented tuberculous lesions in the genital organs, and seventeen showed no tuberculous lesions discernible anywhere in the genito-urinary tract.

We thus see that much the larger number (64 per cent.) of these patients did not have discoverable lesions in the bladder which would explain the symptoms. In these cases the symptoms can be accounted for only as being reflex, being due to irritation of the urine as it passes thrqugh the bladder, or being due to both. We must mention here, as tending to acquit the urine of such irritating action, that some of these cases of subjective symptoms without bladder lesions showed no tubercle bacilli in the urine by microscope or by animal inoculation; one had urine that was normal in every way—that did not show a trace of albumin or a cast, and five had tubercle bacilli in the urine without albumin, etc.; and that of twenty-three cases of subjective symptoms which had no lesions in the bladder but did show tuberculous foci in the genital organs, several had normal urine, eighteen showed no tubercle bacilli, and only five showed tubercle bacilli microscopically or by microscopic examination and animal inoculation. On the other hand, tuberculous lesions were found in the bladder in seventeen patients who had no subjective symptoms.

FINDINGS IN THE TWO GROUPS

Group A, 91 Cases	Group B, 60 Cases
50 were negative to animal inoculation, and otherwise showed no symptoms or signs of tuberculous involvement	
15 gave positive results in animal inoculation, and otherwise showed no symptoms or signs of tuberculous involvement	2 cases proved positive by animal inoculation, and otherwise showed no symptoms or signs of tuberculous involvement
6 showed lesions of the bladder, but did not have subjective symptoms	6 cases showed lesions of the bladder, but did not have subjective symptoms
15 had lesions of the bladder and subjective symptoms	8 had lesions of the bladder and subjective symptoms
5 had no bladder lesions, but did have subjective symptoms referred to the bladder	12 had no bladder lesions who did have subjective symptoms referred to the bladder

We thus find that the foregoing 28 cases, in which we would expect to find tubercle bacilli, were in Group B, i. e., they failed to show the presence of the bacilli on microscopic examination.

Because many of the patients who presented tuberculous lesions in the genito-urinary organs outside the bladder (that viscus appearing normal) complained of painful urination, we will mention here that four men with such lesions and with apparently normal bladders presented no subjective bladder symptoms.

A number of patients were examined by the phlorizin glycosuria test for functional activity of the kidney. The normal kidney will excrete sugar in from eighteen to twenty-one minutes after the hypodermic injection of 1 c.c. of a 1:200 solution of phlorizin. The length of time before the sugar appears is increased when the kidney substance is damaged. In our cases the results were negative. Kidneys which excreted tubercle bacilli, the urine, however, being otherwise normal, responded in the normal time; kidneys which were the seat of chronic inflammation as shown by the excretion of albumin and of other abnormal constituents showed a delayed excretion of sugar.

CONCLUSIONS

1. As to the relation of subjective symptoms to lesions of the urinary tract: We find that frequency, painful urination, tenesmus, etc., do not prove the presence of discoverable lesions in the urinary tract. In fact, in but little over one third of such cases did we find lesions which appeared in themselves as sufficient cause for these symptoms.

2. As to the relation of symptoms to the presence of tubercle bacilli in the urine: Neither can we say that these symptoms, as a rule, are the results of the passing of irritating urine, since in many of these cases the urine is entirely negative or is not sufficiently affected to give reasonable grounds for assuming that it irritates the bladder mouth and urethra sufficiently to cause the subjective disturbances found.

3. As to the presence of tubercle bacilli in the urine in tuberculosis of the genito-urinary organs:

(*a*) Many urines which show the presence of acid-fast bacilli by microscope prove negative in animal inoculation tests. (The converse is infrequent.)

(*b*) Tubercle bacilli are often found in the urine without subjective symptoms or apparent lesions in the urinary organs.

(*c*) Tuberculous lesions in the bladder are often found when the urine shows no tubercle bacilli.

The explanation of the presence of tubercle bacilli in the urine in some cases of genito-urinary tuberculosis and of its absence in others is that the tubercle bacilli are eliminated in "showers," so that it is quite possible to get specimens between the "showers" that are free from tubercle bacilli.

4. Great care is essential in diagnosis of tuberculosis of the kidney, in view of the fact that tubercle bacilli are found in the urine in patients who have neither demonstrable tuberculous lesions of the genito-urinary tract nor symptoms referable to the urinary organs.

"When is a kidney tuberculous?" In the light of these researches and of the reports of other observers (Rist and Kindberg), we can no longer say that the presence of a few tubercle bacilli in the urine shows tuberculosis of the kidney. In former times, before the refinements of diagnosis now available were at our disposal, the argument that a tuberculous kidney must be removed had some basis of good reason, because a diagnosis of tuberculosis of a certain kidney was not made, as a rule, till the kidney was badly injured. Now, the finding of a few tubercle bacilli in the urine from a certain kidney is not sufficient to condemn that organ on the one hand, and on the other hand, the second kidney may show tubercle bacilli in its urine, at the next examination.

1847 Madison Avenue.

Whale Fat.—In Denmark whale fat has been used for margarin since 1914, and Norway is now making experiments with hardened whale fat on account of the shortage of other materials for the margarin industry, according to *Commerce Reports*, February 2. Whaling off the coast of Norway is to begin for government account with the idea of supplementing the fat supply from this source. In 1914 Denmark used 20,000 barrels of hardened whale fat for making margarin, and the product made from it is said to keep well and taste well and to be even better in the form of lard. Different percentages of vegetable oil, such as cottonseed and soya bean, are used to make the lard of the proper consistency. In Denmark, where these products have been used three years, no results deleterious to the human organism have been observed.

A METHOD OF DRAINING THE BODIES OF THE VERTEBRAE

PRELIMINARY REPORT

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Symptoms suggestive of osteomyelitis of the spine in a case of sepsis due to infection by the *Streptococcus viridans* brought vividly to my mind the necessity of working out some technic by means of which, in suitable cases, the bodies of the vertebrae may be rendered accessible to surgical intervention. A brief review of the literature, as well as a personal conference with Dr. Bradford of Boston, convinced me that, as yet, no satisfactory method had been devised. Although in the instance of the patient in question the local symptoms of osteomyelitis subsided, it seems to me of value to report a method which, on the cadaver, gives an excellent operative exposure.

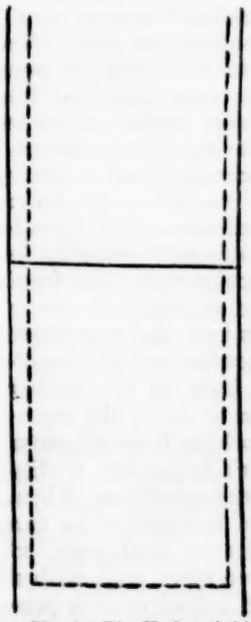

Fig. 1.—The H shaped skin incisions and the line of the hemostatic suture enclosing the muscle flap (dotted line).

The method previously used consists of a resection of the transverse process through a midline incision similar to that used in the typical laminectomy (Menard). It is readily seen by reference to Figure 2 that this method does not expose the body of the vertebra, because the lamina and pedicle are in the way. To approach the body, an oblique route will have to be followed which will enable the operator not merely to bring his instrument to bear on the body of the vertebra, but also to see it accurately. This can be accomplished by the following technic, the essential part of which consists in the upward retraction of a wide muscular flap,

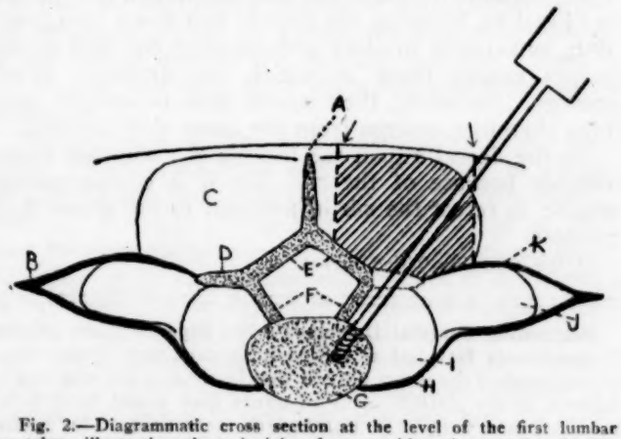

Fig. 2.—Diagrammatic cross section at the level of the first lumbar vertebra, illustrating the principle of approaching the vertebra by the oblique route. The arrows indicate the two longitudinal skin incisions. The shaded area illustrates the muscles which are deflected upward. The resected transverse process is indicated by a dotted line. *A*, spinous process; *B*, lumbar fascia; *C*, spinal muscles; *D*, transverse process; *E*, laminae; *F*, pedicles; *G*, body of vertebra; *H*, anterior layer of lumbar fascia; *I*, psoas; *J*, quadratus lumborum; *K*, middle layer of lumbar fascia.

which permits the operator to work in an oblique line, parallel to the slant of the pedicle:

Assuming that the first and second lumbar vertebrae are diseased, a 6-inch longitudinal incision is made a little to the left of the midline, and at the outer border of the ileocostalis muscle a second longitudinal incision corresponding to the first is also made. These are joined at their midpoint by a transverse incision. The skin flaps are dissected upward and downward, exposing the thick mass of the spinal muscles, that is to say, the multifidus spinae, semispinalis dorsi, iliocostalis and longissimus dorsi. To prevent hemorrhage, a hemostatic suture is now inserted, beginning at the upper outer angle of the wound, running down to the lower angle, across to the spine and upward along the spinous processes. The suture must be taken sufficiently deep to reach the middle layer of the lumbar fascia on the outer side, and the lamina on the spinal side. Corresponding to this suture, a muscle flap is outlined with its base upward, and the entire muscular mass thus freed is drawn toward the head of the patient with strong retractors. This exposes the laminae and transverse processes of the vertebrae in question and the corresponding portion of the middle layer of the lumbar fascia. It is a simple matter now to resect the transverse processes at their base. Working from the outer angle of the wound, the operator's finger can readily free the psoas from the body of the vertebrae. Then, by using an appropriately shaped instrument, he can retract the psoas and the quadratus lumborum, so that he can see the body of the vertebra, and, with a long burr, bore a hole into it and follow up this procedure with a curet.

At this level the nerves are of comparatively little significance and are distinctly smaller than in the lower lumbar region. Even here, however, they can be found and injury avoided, if the operator is careful. After suitable drainage has been instituted, the wound is closed by bringing the muscle flap down into position, suturing it in place and suturing the skin at all points except those at which the drainage tubes emerge. Naturally, their course must be oblique, and they therefore emerge from the outer skin incision.

In the dorsal region the technic is somewhat more difficult because of the ribs, but it is comparatively simple to resect the rib in addition to the transverse process.

41 West Eighty-Third Street.

Reclaiming Surgical Dressings.—The superintendent of the Pennsylvania Hospital at Philadelphia says that 65 per cent. of the surgical dressings used in that institution are reclaimed. Instead of the 200,000 yards of gauze that would have been required in a year, only 55,000 yards were used. The soiled dressings after being collected in paper bags at the bedside or dressing room are taken to the laundry and transferred to net bags and placed to soak in cold water, the water being changed three or four times a day. The next day the net bags are transferred to the sterilizing washer and put through the following steps: two cold water washes without soap or alkali for ten minutes each; forty-five minutes washing in hot water and soap solution; two rinsings in hot water for ten minutes each; after a small amount of hot water is placed in the washer the cylinder is run for forty-five minutes under steam pressure of 12 pounds; after being put through the extractor they are taken while moist to the gauze room where they are stretched, trimmed and prepared for final sterilization.

PROFOUND TOXEMIA AFTER ADMINISTRATION OF NEODIARSENOL (A BRAND OF NEO-ARSPHENAMIN)

J. W. MILLER, M.D.
CINCINNATI

That the administration of the various brands of arsphenamin and neo-arsphenamin are not free from danger is shown by this case:

REPORT OF CASE

A chemist, aged 26, who presented himself for examination and treatment, Dec. 5, 1917, had been exposed to infection eight weeks before. On the appearance of a lesion he reported promptly to his physician, who recognized a syphilitic chancre on the corona glandis. The patient appeared to be in excellent physical condition. The site of the chancre was markedly indurated, and a faint macular eruption covered the shoulders and abdomen. There was general adenopathy, and a positive Wassermann reaction. He received 0.6 gm. of neodiarsenol with absolutely no reaction. One week later, December 12, he reported for a second injection; the site of the chancre showed less induration, and the macular eruption had entirely disappeared; 0.75 gm. of neodiarsenol in 15 c.c. of freshly distilled sterile water was slowly introduced into the vein. He reported next day feeling perfectly well with the exception of a slight headache. The following day, the 14th, he worked as usual in the laboratory of a large manufacturing concern, but told his associates his muscles felt sore, "griplike." On the morning of the 15th he had an epileptiform convulsion and became comatose.

Convulsive seizures continued with intermissions of several hours between the paroxysms for the next forty-eight hours. The respirations were noisy and stridulous, and of the Cheyne-Stokes type. The temperature ranged from 102 to 106 F., and there were profuse sweats. The urine obtained by catheterization amounted to 400 c.c. during the first thirty-six hours. The specific gravity was 1.020; the urine was highly acid, and showed a trace of albumin, diacetic acid, and acetone. Microscopically, blood corpuscles, and hyaline, blood and epithelial casts were found. Complete suppression of the urine finally occurred. The pupils were dilated, and marked retraction of the head to the right was noted. There was a decided increase of spinal pressure, the spinal fluid being Wassermann negative. I ordered epinephrin and Fischer's alkaline solution by rectum as soon as I was notified of the patient's condition. Within a few hours the patient was removed to a hospital, where venesection was performed, 500 c.c. of blood were withdrawn, and then half a liter of Fischer's solution introduced. This was repeated in six hours. Improvement was only temporary, and physiologic sodium chlorid solution was then substituted. Morphin, 0.008 gm., and chloroform inhalations helped to control the convulsive attacks. Death occurred forty-eight hours from the onset of uremic symptoms.

COMMENT

After reviewing the literature relating to similar unfortunate occurrences following the use of various arsenic compounds, I feel certain that the drug was responsible for the fatal outcome. Osler,[1] in writing on acute nephritis, mentions (1) cold, and (2) the poisons of acute specific fevers, as the chief etiologic factors, and further states that "acute nephritis may be associated with syphilis and with acute tuberculosis, particularly the former. Bradford states that many of the idiopathic cases and those incident to cold may be of syphilitic origin." That the patient received his treatments during a period of extremely cold weather, the temperature ranging from zero to 15 degrees below, and was also constantly exposed to toxic agents inci-

1. Osler, William: The Principles and Practice of Medicine, Ed. 8, New York, D. Appleton & Co., 1912, p. 697.

dent to his occupation, which may have some bearing, must be borne in mind. I agree with Likes and Schoenrich,[2] in speaking of diarsenol, and the same may be said of neodiarsenol, "that the preparation in general is good." They ascribe the accidents to variability in quantity and quality in the occasional ampule, due to careless measurements and chemical construction.

628 Elm Street.

DUODENAL FISTULAS

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Scarcity of literature on a medical or surgical subject has, as a rule, one of two meanings: either that the condition is extremely rare, or that the subject has certain unpleasant features connected with it that lead to a perhaps unconscious desire to forget it on the part of the one to whom experience has come. Just how frequently a fistula of the duodenum occurs after suture of a perforation or other operative procedure is difficult to estimate, as there are no reliable statistics available, and such complications are apt to remain unrecorded. Experience gained during apprenticeship, from association and hearsay, and in two personal cases, forces me to conclude that fistulas of the duodenum following operative procedures are neither the rare nor the simple, benign affairs the silence of the professional pen might lead one to conclude. Reference to this subject has almost invariably a pessimistic tone, and but little encouragement is given. Edgerton[1] says, "The result may be a short running, rapidly fatal, duodenal fistula." Pannett[2] says: "As far as can be ascertained from the writings of the last ten years, a duodenal fistula never heals without surgical aid, and if left, is invariably fatal. Moreover, death may be exceedingly rapid. Recovery from a duodenal fistula, even with adequate surgical treatment, is a rarity." At the time of the writing of the lines just quoted, only three "recovery" cases were to be found in the literature of the ten previous years, and these were surgical cures. This behooves us to make greater efforts and a freer interchange of helpful suggestions.

In this paper we are limited to duodenal fistulas because the difficulties encountered in their treatment are peculiar to fistulas so located; the treatment of fistulas is of a rapidly lessening degree of difficulty as they descend the first few feet of the jejunum. This condition of affairs is true for several good and sufficient reasons:

1. Inanition is such as will occur following a fistula in no other part of the intestinal tract, and is comparable in effect to a break in a mill race above the water wheel; no power is obtained.

2. Dehydration rapidly follows unless energetically combated by rectal or subcutaneous injections. This dehydration follows the loss of a large output of fluid in the form of bile (1 liter), pancreatic fluid (0.5 liter), etc., and also the interference with fluid absorption.

3. A marked specific toxic action may follow the systemic absorption of the normal or changed secretions from the uncovered fistulous tract. So little is known of the chemistry of the duodenal secretions that only a surmise is possible as to the presence or absence of a changed secretion in these cases following trauma to the duodenum.

4. The digestive action of the normal secretions has full sway on the duodenal fistula and the tract leading to the surface, to such an extent that the hole shows a progressive enlargement in contradistinction to the behavior of most other intestinal fistulas. Digestion of the skin of the abdomen and back is so rapid and unrelenting as to make the life of the patient a hardship, to himself because of discomfort and pain, and to the nursing force because of the frequency of the needed dressings.

5. The secretions to be controlled are so varied as to render the problem much more difficult than appears at first sight. These are the secretions of the stomach, the liver, the pancreas, and the duodenum itself.

6. Bleeding from the raw surface of the tract may assume alarming proportions.

7. Fat necrosis is sometimes observed in these cases.

8. Extension of peritoneal inflammation may occur, owing to digestion of adhesions.

9. The amount of discharge is out of all proportion to the size of the aperture; this may be due to the sphincteric action of the circular muscle fibers at this location, as described by Ochsner.[3] In view of the foregoing, any methods that have led to a successful issue are of vital interest, in the combating of so difficult and serious a situation.

The treatment of this condition falls into two classes, either the radical surgical interference, or the expectant medical treatment. The surgical method again may be divided into the direct attack on the fistula itself, or an indirect attack on the site of the trouble by some form of a gastro-enterostomy, with or without pyloric exclusion or a jejunostomy. As my two cases come under the second general heading of expectant or medical treatment, I shall not go into the respective merits of the several distinctively surgical methods. Needless to say, they have their advocates and their indications.

The expectant treatment is indicated, provided the patient's general condition will warrant delay, or when the general condition will not permit of radical interference. Surgical intervention, if considered at all, must be made early; one must not be led into waiting until there is no longer sufficient strength to withstand an operation. The expectant treatment has several objects in view: (1) protection of the skin and the tract itself against the digestive action of the secretions; (2) introduction of fluids and nourishment in quantities sufficient to maintain, not only life, but also the reparative power of the tissue; (3) reduction in the amount of gastric and intestinal secretions, and (4) neutralization and dilution of these secretions.

1. The use of a low melting point paraffin applied hot to the dry skin is good; the main point in this application is that the skin must be dry, and this is impossible to accomplish after the epidermal surface has become eroded. Under the latter condition a good zinc oxid lanolin ointment seems to be most efficacious. A solution of pure gum rubber in benzin also forms a satisfactory protective layer. For the tract itself, the

2. Likes, S. H., and Schoenrich, H.: New York Med. Jour., 1916, **104**, 64.

1. Edgerton, F. C., in Johnson: Operative Therapeusis, **3**, 618.
2. Pannett, C. A.: Lancet, London, 1914, **1**, 1109.

3. Ochsner: Tr. Am. Surg. Assn., 1905, **23**, 314.

injection of liquid petrolatum and zinc oxid ointment to the bottom of the tract is not only painless, but apparently is of benefit, and liquid petrolatum, because an inert mineral oil, should be given by mouth in large doses so that it may, in part, coat the fistulous tract from within out.

2. So long as the rectum will retain solutions, it is the best portal for the introduction of fluids and nourishment in this type of case, and a 10 per cent. glucose solution with plenty of sodium bicarbonate added to keep the body strongly alkaline, as shown by the urine with a methyl red indicator, is one of the best ways to accomplish one's purpose. A small amount of tincture of opium will aid in the control of rectal spasms. The time may come when food must be given by mouth, and then such foods must be used as produce the least secretory stimulation.

3. The arrival of the acid chyme in the duodenum is the excitant that begins the chain of events ending in the absorption of "secretin," which, in turn, stimulates to activity the pancreas, liver and upper intestinal glands. Interference with this initiatory process decidedly lessens the output of the latter glandular organs. Fats, oils and allied substances have an inhibitory action on gastric secretion, though the fats may have a direct stimulating effect on the pancreas itself. Milk also calls forth but little gastric secretion, while meat extracts, proteosis, dextrin and maltose call into existence large amounts. Low gastric acidity also favors delay in the opening of the pylorus; not only, therefore, must acid food and acid-producing food be avoided, but also alkalies should be given by mouth in frequent small amounts to neutralize as far as possible the gastric acidity. Alkaline solutions, such as calcium hydroxid, sodium bicarbonate, and alkaline mineral waters have a distinctly inhibitory effect on the amount of gastric secretion. Of the drugs, atropin and epinephrin have the greatest inhibitory effect.

4. Dilution and neutralization of the secretions is very desirable, and a slightly alkaline solution permitted to flow slowly to the bottom of the fistula through a rubber catheter, as in a Murphy drip proctoclysis, will effectively do this, and alone probably would be sufficient if perfect protection of the external skin could be accomplished. However, the seepage of even these diluted secretions over the abdomen, sides and back may quickly cause extension of the skin digestion to such a degree as to force the discontinuance of this method. In looking over the literature recently, I find the report of one other case successfully treated by this method of continuous irrigation of the tract.[4]. In this case the fistula developed on the fifth day after operation, and was healed six days later. The use of this method is advisable as long as the local skin conditions permit. Large amounts of fluid by mouth also dilute the juices.

The first case was comparatively simple, as the fistula was high in the duodenum, probably several inches above the point of emergence of the bile and pancreatic fluids. The second case, however, must represent the most serious type of duodenal fistula, as the opening was directly opposite the papilla of Vater, and the suture line must have been rather continuously bathed in a fluid of extreme digestive power.

4. Cheever, David: Boston Med. and Surg. Jour., 1915, **173**, 454.

REPORT OF CASES

CASE 1.—A man, aged 55, in 1912 underwent a Billroth No. 2 operation, resection of the stomach for cancer. The duodenal stump had been inverted with difficulty, and on the eighth day after operation a full tray was given by mistake. Six hours later intense pain developed, and a discharge of bile and pancreatic fluid came to the surface along the tract of a strip of rubber tissue (no gauze). The abdominal skin digestion was rapid and extensive. Immediately food was withheld by mouth; atropin and sodium fluorid, 1 grain, were given by mouth to inhibit pancreatic activity. Sodium fluorid, 1 per cent., was also used as a wet dressing over the abdomen, and injected along the fistulous tract. Paraffin of low melting point was frequently and freely painted over the skin as a protective coating. The discharge of bile and pancreatic fluids ceased after eight days. The patient left the hospital six days later, with wound and skin thoroughly healed.

CASE 2.—A man, aged 74, operated on, April 2, 1917, gave a rather typical history of commo.. duct stone, and the clinical diagnosis was "probably ball valve stone in papilla of Vater." He had lost 60 pounds. A small contracted gallbladder was found, and a stone was lodged in the papilla. Fully twenty minutes were spent in attempting to milk this upward or downward, and probing failed to push it down into the duodenum. Finally the stone was removed by the transduodenal route without great difficulty. The opening into the duodenum was closed with three rows of No. 1 chromic catgut. The gallbladder, duct, and area of duodenal incision were drained with rubber tubes (no gauze). Drainage was only as free as expected for six days, when, after loosening of the tubes to the duodenal area, the character of the drainage suddenly changed, becoming very profuse, causing rapid and extensive digestion of the skin of the abdomen in a few hours.

On the sixth day after operation, food and fluids were stopped by mouth; 10 per cent. glucose and sodium bicarbonate (2 drams to the pint) were given by rectum. Sodium bicarbonate was given in large doses by mouth during the next several weeks. Atropin was continued over several days until the man pleaded to have it stopped. Sodium fluorid, 1 grain by mouth, and as a 1 per cent. irrigating solution in the fistula, was used for four days, without apparent effect. The abdomen was frequently painted with paraffin for protection, with only partial success. The quantity and irritability of the discharge increased, and the dressings were changed every two hours. On two occasions the dressings were saturated with blood, owing probably to the digestive action of the secretions.

On the twelfth day we began continuous drop irrigation of the wound (40 drops to the minute) with soda solution, through a No. 14 catheter, carried down to the depths of the fistula near the common duct. This was continued until the patient's back became so sore through digestive action of the fluid running into the Kelly pad under him that we were forced to discontinue it, even though decided improvement was noted.

On the eighteenth day the patient's condition was very bad, but he was retaining the rectal nourishment splendidly, and this probably was his salvation. Belladonna and epinephrin were now given by mouth every two hours; the glucose and soda were continued by mouth and rectum, and large doses of liquid petrolatum were given by mouth to coat the entire fistulous tract. Several times daily the fistula was plugged to its depth with sterile 5 per cent. zinc oxid. Daily doses of castor oil were given to insure an open intestinal tract. Selected food was frequently given by mouth in small amounts, of such nature as to cause the least amount of stimulation to the gastro-intestinal secretions. This routine was continued, and finally on about the twenty-eighth day the fistula had gradually closed and the skin soon healed. During this time we had to combat a subacute nephritis. Nine months later this man is still perfectly well except for a postoperative hernia at the site of the drainage. He has had no return of stone symptoms, and has gained 58 pounds in weight.

707 Race Street.

DETECTION OF PRETENDED LOSS OF HEARING

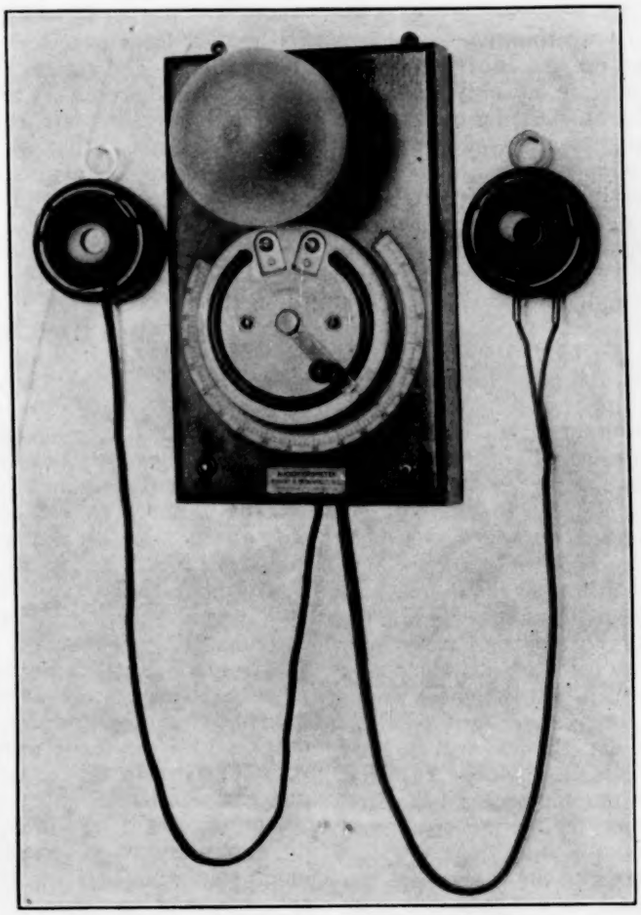
WITH SPECIAL REFERENCE TO UNILATERAL DEAFNESS

R. R. BROWNFIELD, M.D.

PHOENIX, ARIZ.

Aurists have long felt the need of a more accurate test for the acuity of hearing—a test that would be as definite as the ophthalmologist's test for vision. The present war with its prodigal use of high explosives has made the need more keenly felt than ever, and, especially as the damage done to the auditory apparatus is often only temporary, it becomes imperative to have an absolute test to detect those who falsely claim permanent injury purely for the purpose of avoiding further military duty. The necessity for such a test will be even more pressing at the close of the war, when loss of hearing will be either pretended or greatly exaggerated, in order that a pension may be secured.

That the French military specialists have already experienced considerable difficulty in this direction will be evidenced by the statements made by Foy.[1] It appears that the malingerer most difficult to detect is the one claiming complete loss of hearing in one ear. A moment's thought will show why this should be. Were only partial deafness claimed it would not be difficult to trap him, as he could not possibly be consistent in all his statements throughout an extended series of tests; but, with complete unilateral deafness as the claim, he simply and uniformly replies in the negative to all tests applied to the alleged defective ear.



Instrument for testing the acuity of hearing.

After considerable experimenting, I have devised a test which not only definitely determines the acuity of hearing in either ear, but also quickly detects the unilateral malingerer. Before I proceed further, however, it is necessary to describe the instrument used.

It is generally admitted that the acoumeter is the most satisfactory instrument now in use giving direct numerical readings representing the acuity of hearing. This is the instrument used by the French authorities in the tests described in the article referred to. Here a telephone receiver is used to produce the sound, the energy being supplied by the secondary of an induction coil operated by dry cells. As the secondary is withdrawn from the primary coil the sound diminishes, and at the distance of 1 meter it reaches a point at which its perception is taken as indicative of normal hearing. The intervening space is graduated, and forms the scale.

While the French physicians, by the exercise of considerable care and attention, make this device operate with reasonable uniformity and doubtless are securing good results, yet there are so many variable factors involved that it is highly improbable if any two machines under different operators would secure results of approximate uniformity. Thus, there is a continuous and gradual deterioration of the batteries; there is a tendency of the receivers to become more or less demagnetized; and the variable condition of the make-and-break contacts, and the frequency of vibration, also are factors that make uniform results difficult of attainment.

In the device that I use, batteries and make-and-break contacts are entirely dispensed with. The ordinary 110 volt alternating commercial lighting current is used. The variable current is produced by a potentiometer, and is variable from an absolute zero to maximum. No vibrating iron is used, and the maximum strength of current employed is dependent on no factor except the ratio of the electrical resistances employed. The sound producer is similar to a telephone receiver except in one very important respect — the core is of soft iron and is not magnetized. This results in eliminating the variability due to demagnetization and doubles the pitch, so that the ordinary 60 cycle current produces 240 vibrations per second—about equal to the average tone used in conversation.

The sound producer is provided with three lugs to hold it away from the ear, so that the sound will be transmitted solely by air conduction. By simply turning the indicator from 100 to zero, one can cause the sound to increase from the point at which it is just perceptible to one of normal hearing, the threshold of audition, or 100 per cent. acuity, to a degree of intensity at which failure to perceive it indicates that the subject has no practical hearing. In addition to the variable receiver, there is a supplementary one that always operates at maximum intensity, irrespective of the loudness of the other.

In the usual test for the acuity of hearing, only the variable receiver is used. As the subject holds this to the ear, the pointer is gradually moved from zero to

1. Foy, Robert: La nature, Paris; reprinted in the Scientific American Supplement, June 16, 1917.

the 100 point. As the intensity of the sound gradually decreases, he is told to indicate the point at which he is no longer able to perceive it. This point is noted, and the movement of the pointer continued still farther. The direction is then reversed and the subject is directed to indicate the point at which the sound is again heard. After one or two trials, the various readings will be found to harmonize quite closely unless one has a case of malingering, which may be readily detected by inconsistency of the readings. It is hardly necessary to remark that the electric control has a distinct advantage over the watch and whisper tests, as the malingerer is totally unable to guess what reply would be expected from one of defective hearing. The only precaution necessary is to place the instrument back of him. A small push button is provided which may be used to disconnect the receiver, in case the subject is uncertain whether he hears the vibrations or is confusing it with tinnitus.

Let us now suppose that we are confronted by a subject who has suffered complete but only temporary loss of hearing in one ear due to an explosion, and now uniformly persists in refusing to respond to any test applied to that ear. We simply have him hold the constantly loud receiver over the alleged deaf ear, and the variable receiver over the other. Starting with the pointer at 100 (minimum sound), we gradually move it toward zero and direct the subject to state when he first hears the sound *in his good ear*. If he really suffers complete loss of hearing in one ear, as claimed, the presence of the loud receiver will not disturb him or interfere with the perception of sound by the other ear; in fact, it might just as well be disconnected. Under this presumption he would have no difficulty in clearly detecting the sound in the other ear, and we would soon have a proper index of its acuity. If, however, he is merely pretending and actually has a very fair degree of hearing in both ears, it would be absolutely impossible for him to identify any sound whatever in his good ear to which the variable receiver is applied until a point on the scale is reached that would normally indicate very defective or almost no hearing for the good ear.

The very nature of the test, it will be noted, facilitates the detection of fraud, because the better he can hear in the alleged defective ear, the less will he hear in the other—a condition just the opposite of what he might expect; and so when he makes his usual negative reply, he is for once telling the truth and trapping himself.

Without attempting to enter into the theoretical law of reciprocal auditory responses, it will suffice to state that under these conditions the sound appears to come in some mysterious way from a point at the center of the head; and if the two ears are approximately equal in acuity, there is absolutely no possibility of identifying the gradually increasing sound in the supposedly good ear until a point is reached on the scale away beyond the reading that would be obtained when the loud receiver is disconnected. Hence, in the case of our pretender, we have merely to repeat the test with the loud receiver disconnected; and a totally different and representative reading will be secured, thus proving the deceit.

In case the subject has partially recovered, but will not admit it, this fact may be readily ascertained by a comparison of the two acuity readings for the good ear—one reading to be taken with the loud receiver applied to the defective ear, and a second reading with the loud receiver removed or disconnected. It will readily be seen that the greater difference between the acuity of the two ears, the less difference will there be between the two readings of the good ear. In a case of complete unilateral deafness, this difference will be zero; while with a subject of normal hearing in both ears, the difference will be practically 100.

The inability of the brain to differentiate between the two sources of sound that I use, when one is of lesser intensity, is indeed remarkable in view of the independent action of the ears in other tests. This independence may be readily demonstrated by holding a watch to one ear, while a second watch is gradually moved away from the other ear. It will be found that the loud ticking in the one ear has little or no effect on the ability of the other ear to detect the very faint ticking of the distant watch. And yet in the instrument that I use, the ear to which the sound of lesser intensity is applied loses practically all power of independent perception. The reason for this doubtless lies in the fact that both receivers are not only of identical timber and of absolutely the same pitch, but also are always "in step;" that is, if one diaphragm is moving toward one ear, so also is the other diaphragm moving toward the other ear, and vice versa. This, of course, must necessarily be the case, as the two receivers are operated by the same alternating current, and perfect synchronism is, therefore, unavoidable.

In the article by Dr. Foy, a test for pretended unilateral deafness is given in which "two assistants read, in whispers, two different texts into separate funnels, each connected respectively with an ear of the patient by a rubber tube. The 'monodeaf' man will repeat what is read into his good ear; the simulator of unilateral deafness can repeat nothing; for hearing both texts will confuse him."

I have not been able satisfactorily to verify Dr. Foy's results. This test was made several times with subjects of normal hearing, and in every case it was found possible to avoid the confusion in sound by simply concentrating the attention on one ear. As a proposed improvement, I had constructed a phonograph sound box having two distinct diaphragms and needles, so disposed that one would travel across the record about a quarter of an inch in advance of the other. Two ear tubes were provided, and a speaking record used. In this arrangement, it will be evident, one ear was listening to totally different words from the other, and it was thought that as the unavoidable difference existing between two speakers would be eliminated and as a uniform pitch and rapidity of speech would be secured, the apparatus would be a great improvement on Dr. Foy's method. The results were totally disappointing, however, as persons with normal hearing in both ears apparently had no difficulty in deliberately listening with one ear to the almost total exclusion of the other. Experiments along this line were soon abandoned, as the results were as uniformly disappointing, as those employing the simple harmonic sound were surprisingly successful.

Three Important Sociologic Measures.—For these three important measures—public employment service, extension of accident compensation, and the adoption of workmen's health insurance—there has already been ample preparation and agreement in time of peace. While earnestly sifting new proposals for the after-war reconstruction period, no time should be lost in putting these three well-tested measures into operation.—John B. Andrews, *The Survey*.

THE DUST HAZARD IN CERTAIN INDUSTRIES *

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AND
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No health hazard in industry has attracted so much attention, and rightly so, as dust, and yet few exact studies on its nature and quantitative features have appeared. It is not enough to know only that dust has an influence on health, or even what the resultant pathologic conditions are; it must also be shown how these effects are brought about. In order to approach this problem intelligently, it is of prime importance to appreciate certain things about dust itself, and in this communication are presented briefly the results of investigations on the dusts of various industries. These show the number of particles per unit volume of air and their approximate size, the weight and relative mineral content, the influence of relative atmospheric humidity and of exhaust ventilation on these factors, and the amount that reaches the lungs of those exposed.

The dust samples have been collected directly from the air, at the respiration level, by means of the Palmer apparatus,[1] which is now accepted as a standard by the American Public Health Association, and the determinations have been made by the methods of Palmer, Coleman, and Ward,[2] as modified by Smyth.[3] The chief advantages of this apparatus are that it allows a very large volume of air to be sampled, and that it may be operated continuously over considerable periods of time, both these factors greatly augmenting its accuracy. Arens,[4] in 1894, collected the dust from 200 liters (quarts) of air for his studies; but our results, except where the dust was extremely thick, are based on samples from 200 cubic feet, forty minutes of continuous operation being required for this amount. This period of time is sufficient to allow for ordinary variations in dust production and in the direction and intensity of air currents.

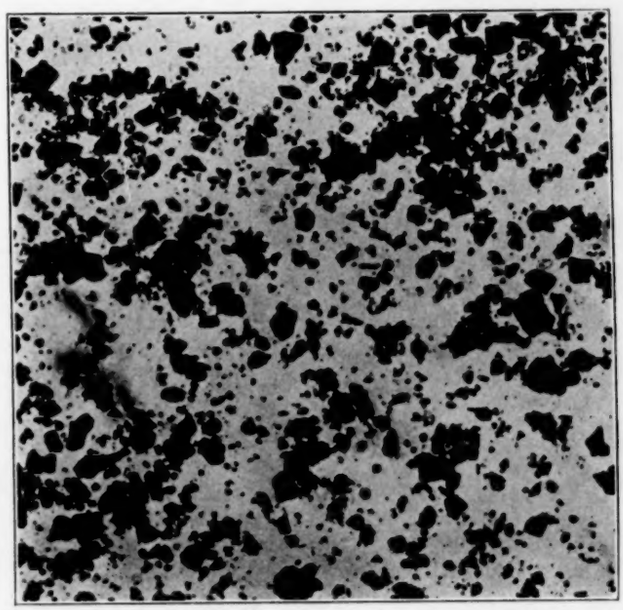

Fig. 1.—Dust collected from the air of the coal grinding room of a cement plant; × 100; appearance after settling in a Sedgwick-Rafter cell; obtained by passing 50 cubic feet of the air through 100 c.c. of distilled water.

STANDARD DUST VALUES FOR PHILADELPHIA

In order to have, as standards, certain dust values with which our results in the industries might be compared, five tests were made outside such establishments, as follows: one each in the country and the city outdoors, one in a country home, and two in city laboratories. Table 1 gives the results of these tests, with averages, and these we have accepted as normal values for Philadelphia and its vicinity. Outdoor country air, the most dust-free examined, showed under 20,000 particles per cubic foot with 2.2 mg. of solids in each hundred cubic feet, and indoor country air under 25,000 particles with 5.4 mg. of solids. Outdoor city air contained about twice as many particles as the latter, with 7.8 mg. of solids, and the laboratory air averaged about six times as many particles with three times the weight. A striking difference is seen in the relative proportion of small and large particles when comparing city with country air, the latter containing relatively fewer of the smallest countable ones. The somewhat low percentage of inorganic material in the laboratory dust resulted partly from an abundance of coal particles which came from a near-by freight railroad and a large power plant stack.

TABLE 1.—RESULTS FROM THE EXAMINATION OF DUST IN COUNTRY AND CITY AIR

Location	Particles				Weight	
	Number per Cu. Ft.	Percentage Distribution According to Size*			Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
		1	2	3		
Country:						
Outdoors	19,600	5	46	49	0.0022	
Indoors	24,400	4	55	41	0.0054	
City:						
Outdoors	48,400	2	27	71	0.0078	
Laboratory	123,800	2	25	73	0.0045	31
Laboratory	150,600	1	24	75	0.0242	36
Average	73,360	3	35	62	0.0088	34

* In this and the succeeding tables, Size 1 refers to the largest observed particles, averaging about 40 microns in diameter, Size 3 to the smallest ones, averaging about 1 micron, and Size 2 to the intermediates.

INORGANIC DUSTS

Portland Cement.—In Table 2 are given the results of tests on eleven dust samples from three Portland cement plants situated in the Lehigh Valley of Eastern Pennsylvania. These are averaged as a whole and also by the presence or absence of exhaust ventilation, departments 33 c, 34 c, and 38 r having such ventilation by means of stacks over the conveyors. No other industry gave results so high in either count or weight, the average being almost 7 million particles per cubic foot and over 0.2 gm. of solids in 100 cubic feet. The number of particles in three tests was appalling, two running over 13 million and one over 15 million, and

* From the Clinic for Diseases of Occupation of the University Hospital and from the Laboratory of Hygiene, University of Pennsylvania.
* Read before the Section on Medicine of the College of Physicians of Philadelphia, Dec. 17, 1917.

1. Palmer, G. T.: A New Sampling Apparatus for the Determination of Aerial Dust, Am. Jour. Pub. Health, 1916, **6**, 54.
2. Palmer, G. T.; Coleman, L. V., and Ward, H. C.: A Study of Methods for Determining Air Dustiness, Am. Jour. Pub. Health, 1916, **6**, 1049.
3. Smyth, H. F.: To be published.
4. Arens, Carl: Quantitative Staubbestimmungen in der Luft nebst Beschreibung eines neuen Staubfängers, Arch. f. Hyg., 1894, **20**, 325.

the lowest count in any of the cement departments was 1¼ million. The highest weights were 0.4928 and 0.4736 gm. The ratio of small to large particles was between the extremes of country and city air. A comparison of the number of particles with the weights in Departments 35 r, 36 r and 37 r shows that while the numbers increase the weights decrease. This is due to a difference in the specific gravity of the dusts and to differences in the sizes of the particles. The percentage of inorganic matter varied from 21 to 90, the dust from the coal grinding room showing the lowest. The averages for the departments with and without exhaust ventilation show clearly that such exhausts effect both a great reduction in the number of particles and in the weight, and also a slight reduction in the percentage of the smallest sized particles.

TABLE 2.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE CEMENT INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size: 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
22 w	Clinker	13,560,000	3	39	58	0.4928	87
34 c	Clinker	2,394,400	6	54	40	0.2256	88
38 r	Clinker	1,872,000	5	20	75	0.0920	70
23 w	Rock	9,014,400	1	45	54	0.1332	90
33 c	Rock	1,291,200	5	51	44	0.0696	72
37 r	Rock	15,524,000	1	32	67	0.3016	85
24 w	Coal	4,042,400	3	46	51	0.1240	35
36 r	Coal	13,720,000	8	37	55	0.3332	21
25 w	Ball	3,244,800	1	41	58	0.0690	78
26 w	Kiln	1,641,600	3	46	51	0.0792	65
35 r	Packing	8,395,200	2	40	59	0.4736	85
	General average	6,790,900	3	37	60	0.2185	72
	Average for 8 departments without exhausts	8,642,800	3	38	59	0.2533	71
	Average for 3 departments with exhausts	1,852,530	5	40	55	0.1291	81

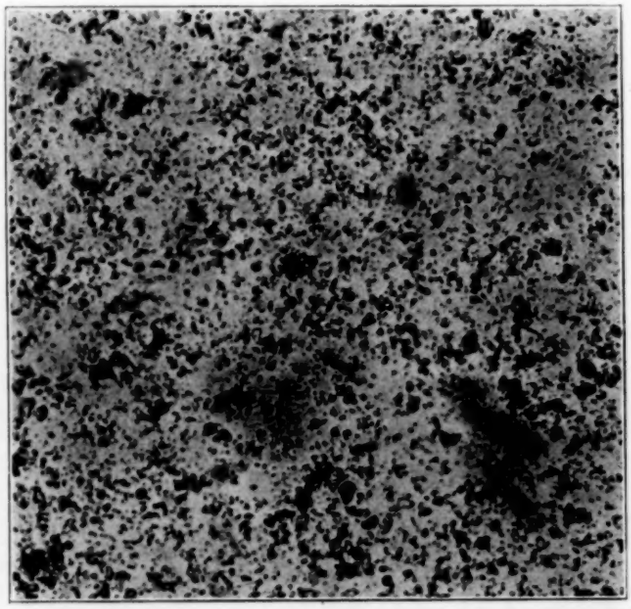

Fig. 2.—Dust collected from the air of the rock grinding room of a cement plant; × 100; appearance in Sedgwick-Rafter cell; amount of dust in 50 cubic feet of the air suspended in 100 c.c. of distilled water.

TABLE 3.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE FLINT INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size: 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
54 e	Ball grinding	582,400	5	31	64	0.0384	67
55 e	Crushing	937,600	3	26	71	0.0464	86
56 g	Ball grinding	1,120,100	4	36	66	0.0336	76
	Average	844,040	4	31	65	0.0459	76

Flint.—Three tests were made in two flint mills (Table 3). Unfortunately, the sampling in one mill (54 e and 55 e) was rather unsatisfactory because of a defective electric current, and the results should probably have been slightly higher than here recorded. In this plant the crushing, which was not protected, generated more dust than the ball grinding, and incidentally the man feeding the crusher was continually exposed. In the other flint establishment (56 g) the crushing mills were enclosed and supposedly protected by strong exhaust suction, but, as sometimes happens, the suction was not detectable, owing to loosened boards in the upper part of the enclosure. The ball grinding drums were enclosed at both mills, as they should be. This dust showed a high percentage of Size 3 particles.

TABLE 4.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE STEEL GRINDING INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size: 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
63 b	Dry ball grinding	1,066,200	6	34	60	0.0840	100
64 b	Oil grinding	90,000	8	21	71	0.0125	92
47 d	Machine shop	313,600	9	21	70	0.0304	
	Average	489,930	7	31	67	0.0433	96

Steel Grinding.—Samples of dust from the emery grinding of steel were taken in a machine shop of a textile mill and in a ball bearing factory, and the results are recorded in Table 4. The most striking fact is the great difference in the figures for the two departments of the ball bearing factory: in the dry grinding department (63 b), where the horizontal emery wheels throw countless particles in every direction and where incidentally the workers have no protection whatever, the figures are high, while in the oil grinding room (64 b), where the process is the same except that the balls run in oil, the count and weight of the dust is reduced to a twelfth and a seventh, respectively, of the former, these figures being practically those of our standard. This is a strik-

TABLE 5.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE ASBESTOS INDUSTRY, WITH AVERAGES SHOWING THE EFFECT OF EXHAUST HOODS

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size: 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
57 a	Weaving	240,800	3	25	72	0.0277	31
58 a	Carding	900,800	5	40	55	0.0416	87
66 k	Carding	212,800	3	41	56	0.0128	82
65 k	Carding	90,400	5	31	64	0.0148	81
59 a	Crushing	1,163,200	4	36	60	0.0536	76
67 k	Crushing	356,800	7	57	36	0.0456	81
	Average	494,100	4	29	57	0.0354	73
	Average for departments without exhaust hoods	768,300	4	34	62	0.0409	69
	Average for departments with exhaust hoods	220,000	5	43	52	0.0226	81

ing illustration of the value of wet processes. The dry ball grinding is the only department of the entire series showing dust composed entirely of mineral matter.

TABLE 6.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE POTTERY INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
49 l	Glaze dipping..	152,800	8	41	51	0.0144	38
50 l	Jiggering.....	189,600	4	33	63	0.0120	67
51 l	Kiln.....	249,600	4	33	63	0.0200	64
52 m	Pressing.....	163,200	4	28	68	0.0072	67
53 e	Pressing.....	158,400	4	33	63	0.0084	71
Average.....		182,720	5	34	61	0.0130	60

Asbestos.—Table 5 records the results of six tests in two asbestos fiber weaving mills, the second of which had almost completed the installation of an exhaust system for dust removal. The averages in these two mills show clearly the effect of such dust removal, not only in lessening the number of particles and the weight of the dust, but also in decreasing the percentage of the smallest sized particles.

Crushing is seen to be the dustiest process, and it is also the most difficult to guard properly. The crushing room that did not have a suction system (59 a), with over 1 million particles per cubic foot, ranked next to the cement departments in dustiness, and above any of the steel or flint departments, and the carding room in the same mill (58 a) was not far behind. The percentage of inorganic matter in this dust varied from 31 to 82.

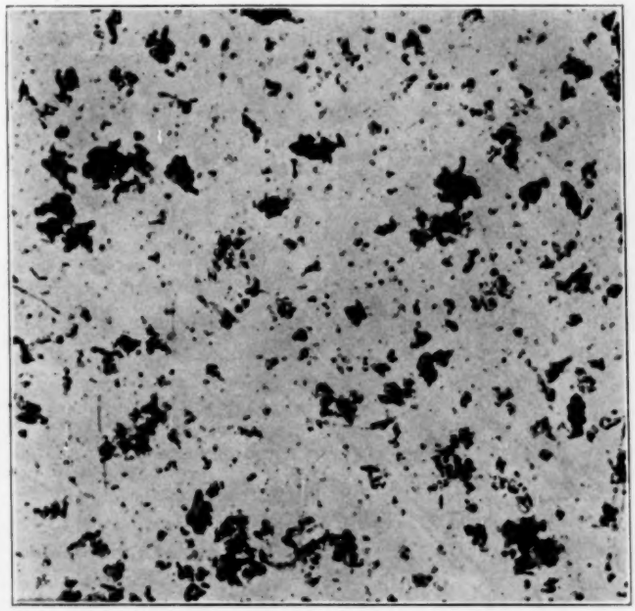

Fig. 3.—Dust collected from the air of a flint grinding mill; × 100; appearance in Sedgwick-Rafter cell; amount of dust in 200 cubic feet of the air suspended in 100 c.c. of distilled water.

Potteries.—Table 6 gives the results of five dust tests in three potteries located in Trenton, N. J. These are the lowest figures shown by any of the inorganic industries, the highest count being under 300,000. The latter (51 l) was in a kiln room where tableware was being packed in saggers with powdered flint, and this packing was done in especially constructed boxes with strong exhaust suction at the rear. With the exception of this one department, there was very little variation in the counts in this industry, though there was considerable difference in the weights. The relatively high weight, in proportion to the count, in the glaze dipping room was due to 8.6 per cent. of lead in this dust, a somewhat lower percentage than in the glaze itself. Calculations show that the workers here inhale at most under 2 mg. of lead a day. The percentage of smallest particles here was somewhat less than in the flint mill tests.

ORGANIC DUSTS

Plush, Blanket and Carpet.—Thirteen tests were made in three divisions of a large textile mill making silk and mohair plush, woolen blankets, aeroplane wing cloth, and carpets (Table 7). The wool breaking room (33 d) in the carpet factory showed by far the worst organic dust conditions encountered, with 430,000 particles, little less than in the best flint mill test, and with 0.39 gm. of solids, exceeded only by the three highest tests in cement. It so happens also that this dust is peculiarly harmful, because as the raw, unwashed wool is fed to the breaker, much of the dirt from it is blown directly back into the face of the feeder. Another equally harmful dust tested in this mill, which gave a lower count and weight but a decidedly higher percentage of mineral matter, was that in the rag picking room (43 d), where filthy woolen rags of all descriptions are fed by hand into a shredding machine. The shredded material is blown into a supposedly closed room, but the door is left open, allowing the fine shreds and dust to escape into the main room; and furthermore, at intervals, the operative enters the enclosure and brings out the material by the double armful to bale on the open floor. In so doing he is exposed to much more dust than the results of the test, taken near his station when he is feeding the machine, would indicate. In general, plush mill dusts gave higher counts than carpet mill dusts, but one weaving room (29 d) gave a very low test (under 77,000 particles), little more than one third of the count in the other plush weaving room. Tests in the blanket mill gave remarkably low counts, owing to greater cleanliness and also to the use of wet processes, the bobbins being loaded with steamed thread. Thus again is seen the value of wet processes. All tests in these three mills showed more or less mineral matter in the so-called organic dust, from 17 per cent. in the wool breaking (33 d) to 68 per cent. in a plush weaving room (29 d). Some of the mineral matter in the dust from the weaving rooms is no doubt due to the wear and tear of the machinery.

TABLE 7.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE BLANKET, PLUSH AND CARPET INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
29 d	Plush weaving...	76,600	3	41	56	0.0148	68
30 d	Plush finishing...	130,800	6	18	76	0.0180	31
31 d	Plush shearing...	195,600	4	27	69	0.0252	67
32 d	Plush tiger.....	150,400	6	34	58	0.0220	29
40 d	Plush weaving...	208,000	12	11	77	0.0576	44
41 d	Blanket weaving.	48,000	17	37	46	0.0272	41
42 d	Blanket napping.	97,500	13	23	64	0.0160	55
33 d	Wool breaking...	430,000	7	29	64	0.3904	17
43 d	Rag picking.....	110,400	16	22	62	0.0226	45
44 d	Wool carding....	103,400	27	15	58	0.0240	33
45 d	Carpet finishing..	124,800	5	17	78	0.0116	62
46 d	Carpet weaving..	149,600	11	37	52	0.0112	60
48 d	Wool breaking...	112,000	13	24	63	0.0144	22
Average.....		148,950	11	24	65	0.0504	44

Felt Hat.—Only three tests in a hat factory were made, all in departments handling unfelted fur (Table 8). They show fair conditions, with no very high

TABLE 8.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE FELT HAT INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
60 s	Fur cutting....	153,100	2	28	70	0.0160	30
61 s	Fur blowing....	133,600	8	32	60		
62 s	Forming.....	91,360	3	42	55	0.0176	48
	Average for the 3 departments.....	126,020	04	33	63	0.0168	39

count, and the decreasing percentage of smallest particles shows the effect of brushing and blowing in cleaning the fur before forming. Lower counts in the

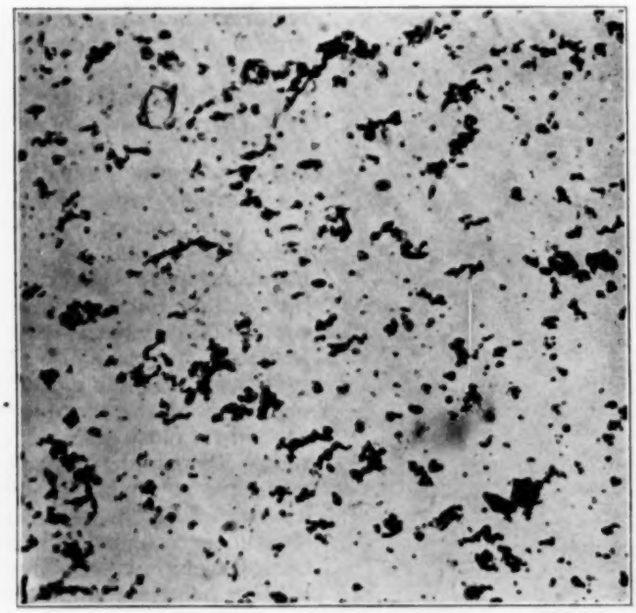

Fig. 4.—Dust from the air of the dry grinding department of a steel ball bearing plant; × 100; appearance in Sedgwick-Rafter cell; the dust of 200 cubic feet of the air suspended in 100 c.c. of distilled water.

brushing and forming departments are doubtless partly due to increased humidity. The highest count is seen in the most dangerous process, fur cutting (60 s),

TABLE 9.—AVERAGE RESULTS OF DUST EXAMINATIONS IN NINETEEN DEPARTMENTS OF SIX CIGAR FACTORIES

Department	Number Studied	Particles: Number per Cu. Ft.	Percentage Distribution According to Size 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
Banding.....	3	25,000	8	46	46	0.0055	55
Packing.....	5	61,600	5	50	45	0.0036	45
Stripping.....	3	90,500	6	40	54	0.0068	30
Hand cigar making.....	2	90,200	8	49	43	0.0075	
Casing.....	1	164,200	2	55	43	0.0066	77
Machine cigar making.....	3	216,500	6	44	49	0.0069	
Stock.....	2	235,000	7	48	45	0.0104	71
Average....	19	102,600	6	47	47	0.0084	56

where the fur is full of dried "carrot" (mercury acid nitrate), this being put on to aid in the felting process, and the dust here is liable to cause mercurial poisoning

Cigar.—The results of our nineteen tests in cigar factories have been reported elsewhere;[5] hence only the averages in the different departments are given here (Table 9). While in general these tests show comparatively little dust, yet two counts of over 300,000 particles were made, and one test gave a weight of 0.017 gm. The somewhat high inorganic content of the dust is doubtless due to sand, which is invariably

TABLE 10.—RESULTS FROM THE EXAMINATION OF DUSTS IN THE SILK INDUSTRY

Index Number	Department	Particles: Number per Cu. Ft.	Percentage Distribution According to Size 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
27 q	Weaving.....	180,800	15	2	83	0.0040	60
28 q	Winding.....	64,200	32	3	65	0.0050	40
	Average for the 2 departments.....	87,000	23	3	74	0.0045	50

associated with tobacco, and to the wear of the machinery.

Silk.—Two tests were made in a model silk factory, and Table 10 shows that these gave results averaging better than in any other industry, and exceeded only by country air and a few individual tests in cigar factories. This was due to extreme cleanliness and to artificially increased humidity. The inorganic content of this dust averaged 50 per cent.

TABLE 11.—SUMMARY OF AVERAGES OF DUST EXAMINATION RESULTS FOR THE SEVERAL INDUSTRIES, GROUPED ACCORDING TO THE INORGANIC OR ORGANIC NATURE OF THE DUST

Industry	Number of Tests	Particles: Number per Cu. Ft.	Percentage Distribution According to Size 1	2	3	Weight: Per 100 Cu. Ft., Gm.	Per Cent. Inorganic
Inorganic Group							
Cement....	11 (2)	6,790,900	3	37	60	0.2185	72
Flint.....	3 (2)	844,040	4	31	65	0.0459	76
Steel.....	3 (2)	439,980	7	31	62	0.0433	96
Asbestos...	6 (2)	494,100	4	39	57	0.0854	73
Pottery....	5 (3)	182,720	5	34	61	0.0180	60
Average..	28 (11)	1,777,970	4	37	59	0.0717	76
Organic Group							
Blanket.... Plush..... Carpet.....	13 (3)	148,960	11	24	65	0.0504	27
Hat.....	3 (1)	126,020	4	33	63	0.0168	39
Cigar.....	19 (6)	102,600	6	47	47	0.0085	56
Silk.....	2 (1)	87,000	3	21	76	0.0045	50
Average..	37 (11)	116,190	6	31	63	0.0201	42
Standard							
Average....	5 (4)	73,360	3	35	62	0.0088	84

SUMMARY OF AVERAGES

Table 11 gives a general summary of the averages for the several industries, grouped according to the organic or inorganic nature of the raw material used. A remarkable uniformity in the percentage of different sized particles in all the tests is observed. It will be seen that the dustiness is much greater in the inorganic class, and that, although the percentage of inorganic material is naturally greater in this group, yet the so-

5. Smyth, H. F., and Miller, T. G.: A Hygienic Survey of Cigar Manufacturing in Philadelphia, Med. and Surg., 1917, 1, 698.

called organic dusts show a mineral content averaging 42 per cent.

EFFECT OF HUMIDITY

In forty instances in which dust tests were made, relative humidity readings were taken at the same time with a sling psychrometer, and Table 12 shows that as

TABLE 12.—EFFECT OF HUMIDITY ON THE SIZE OF DUST PARTICLES

Relative Humidity	Number of Tests	Percentage Distribution of Particles by Size		
		1	2	3
From 35 to 39	4	7	36	57
From 40 to 49	15	8	36	56
From 50 to 59	11	6	34	60
From 60 to 69	8	5	33	62
As humidity increases		Decreases	Decreases	Increases

the humidity increases the percentage of the larger particles decreases, the minute ones correspondingly increasing. Table 13 shows the effect of increases in humidity in individual industries, indicating, in general,

TABLE 13.—EFFECT OF INCREASES IN HUMIDITY ON THE TOTAL DUST COUNT IN SEPARATE INDUSTRIES

Industry	Number of Tests	Effect on Total Count
Plush	5	Irregular
Blanket	2	Decreased
Carpet	4	Irregular
Cigar	9	Decreased
Hat	3	Irregular
Pottery	4	Decreased
Asbestos	6	Decreased

a tendency to lessening of the total dust count. This is naturally more marked with the more hygroscopic dusts.

TABLE 14.—AVERAGE AND MAXIMUM WEIGHTS OF DUST IN THE VOLUME OF AIR INHALED BY A WORKER IN VARIOUS INDUSTRIES, WITH ESTIMATIONS OF THE AMOUNT REACHING THE LUNGS

Industry	Tests	Weight of Dust in Air Inhaled by a Worker		Estimated Amount Reaching the Lungs in a Year of 300 Days, Gm.	Estimated Number of Years Required for 1 Pound to Reach the Lungs
		Per Day of 8 to 10 Hours, Gm.	Per Year of 300 Days, Gm.		
Portland cement	Average of 11	0.4559	146.77	45.59	10.9
	Maximum	1.0644	310.32	106.44	4.7
Carpet	Average of 6.	0.1420	42.60	14.20	35.0
	Maximum	0.7027	210.81	70.27	7.06
Steel grinding	Average of 3.	0.0861	25.83	8.61	57.0
	Maximum	0.1599	47.97	15.99	31.0
Flint grinding	Average of 3.	0.0663	19.89	6.63	
	Maximum	0.0829	24.87	8.29	60.0
Asbestos	Average of 6.	0.0573	17.19	5.73	
	Maximum	0.1161	34.83	11.61	45.0
Plush	Average of 5.	0.0496	14.85	4.95	
	Maximum	0.1037	31.11	10.37	48.0
Blanket	Average of 2.	0.0389	11.67	3.89	
	Maximum	0.0490	14.70	4.90	
Felt hat	Average of 2.	0.0242	7.26	2.42	
	Maximum	0.0253	5.08	2.53	
Pottery	Average of 5.	0.0187	5.61	1.87	
	Maximum	0.0288	8.64	2.88	
Cigar	Average of 18	0.0147	4.41	1.47	
	Maximum	0.0291	8.73	2.91	
Silk	Average of 2.	0.0081	2.43	0.81	
	Maximum	0.0090	2.70	0.90	

WEIGHT OF DUST INHALED AND REACHING THE LUNGS

From our data, calculations were made of the amount of dust in the air inhaled by the various workers in a day. These estimates were based on the assumption of 30 inches of tidal air per respiration, and of 18 respirations per minute, this giving approximately 18 cubic feet per hour. From these results, further estimations were made of the amount of dust contained in the air inhaled per working year of 300 days, and of the amount that would reach the lungs. Lehmann and his co-workers[6] found that from 35 to 42 per cent. of inhaled white lead dust reached the lungs, and so we figured on at least one third of the various inhaled dusts gaining entrance. Table 14 gives our calculations based on the average and the maximum tests in each industry, and in a few instances records the time that would be required for 1 pound of dust to reach the lungs. Table 15 gives corresponding results for city and country air. From the former table it will be seen that the average cement worker inhales almost a half gram of dust a day, and that over 45 gm. reach the lungs each year, less than eleven years being required for 1 pound to gain entrance. A worker in the dustiest room inhales over 100 gm. a year, and takes in 1 pound in less than five years. The average carpet mill worker inhales 0.142 gm.

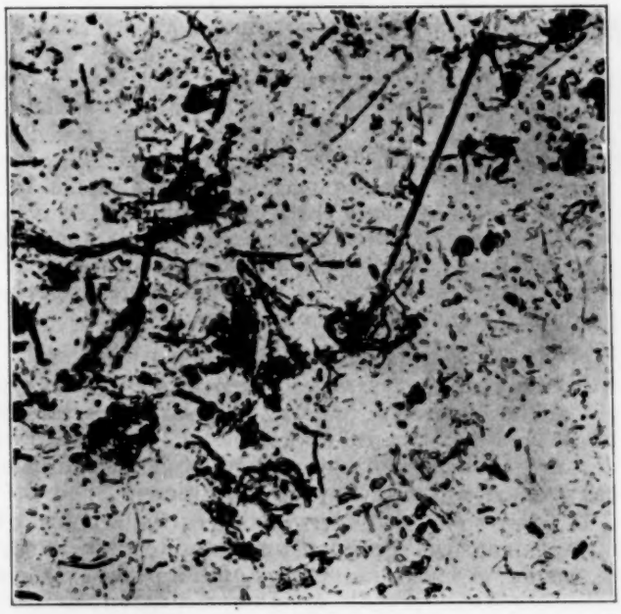

Fig. 5.—Dust collected from the air of an asbestos factory; × 100; appearance in Sedgwick-Rafter cell; the dust of 150 cubic feet of air suspended in 100 c.c. of distilled water.

daily, but the feeder of the wool breaker takes in over 0.7 gm., and the latter would receive a pound in a little over seven years. The steel ball bearing grinder

TABLE 15.—AVERAGE AND MAXIMUM WEIGHTS OF DUST IN THE VOLUME OF AIR INHALED BY AN INDIVIDUAL OUTDOORS AND INDOORS IN PHILADELPHIA, WITH ESTIMATIONS OF THE AMOUNT REACHING THE LUNGS

Location	Tests	Weight of Dust in Air Inhaled by an Individual		Estimated Amount Reaching the Lungs in a Year of 365 Days, Gm.	Estimated Number of Years Required for 1 Pound to Reach the Lungs
		Per Day of 24 Hours, Gm.	Per Year of 365 Days Gm.		
Indoors	Average of 3	0.0492	17.96	4.92	100.0
	Maximum	0.1045	31.35	10.45	48.0
Outdoors	Average of 2	0.0299	10.92	2.99	
	Maximum	0.0503	15.09	5.03	99.0

would take thirty-one years to secure a pound, and in none of the other of these industries would so much

6. Lehmann, K. B.; Saito, Y., and Gfrörer, Walter: Ueber die quantitative Absorption von Staub aus der Luft durch den Menschen, Arch. f. Hyg., 1911-1912, 57, 152.

be taken in during the average working life of an employee. These amounts would be much increased, however, in workers with any form of nasal obstruction, since Lehmann found that in mouth breathing 80 per cent. of inhaled dust reached the lungs. Arens[4] calculated that a cement worker would inhale 1.12 gm. of dust a day, a foundryman 0.14 gm., a wool worker 0.1 gm. and a schoolboy 0.0024 gm., these figures comparing fairly well with those here reported.

VARIATIONS IN DUSTINESS

These tests cannot show all the variations that are likely to occur in dust production; but in any study of the dust problem this factor must not be overlooked entirely. Some of our impressions will therefore be recorded. In the dustiest industry included in our survey, cement manufacture, no appreciable variations were suspected except in the packing department. In the flint mills the production was constant in the crushing department, but in the ball grinding department it was greatly increased when the cylinders were charged or emptied; at no time, however, was the air even comparatively free from dust. In the asbestos mills, no appreciable variations were probable. In the pottery kiln room, dust was an appreciable factor only when saggers were being packed or emptied. Elsewhere in the potteries, conditions were more uniform. In the machine shop and the ball bearing grinding room, there were intervals of comparative quiet and of a decrease in dustiness around each machine. Much more variation in dust production occurred in the textile mills and other factories producing organic dusts.

CONCLUSIONS

A study of dust samples taken directly from the air, at the respiration level, of sixty-five departments of twenty-two plants, representing five industries dealing with inorganic and four with organic materials, has given rise to the following conclusions:

1. For a complete understanding of the problem of dust in industry, there must be considered not only its weight, but also the number of the particles, their nature, whether organic or inorganic, and their percentage distribution according to size.

2. The order of the industries studied in regard to dustiness, as determined by weight, was (1) Portland cement; (2) plush, carpet and blanket; (3) flint grinding; (4) steel grinding; (5) asbestos; (6) felt hat; (7) pottery; (8) cigar, and (9) silk.

3. The order as determined by the count of particles was the same except that (1) the asbestos, (2) the plush, carpet and blanket, and (3) the felt hat industries were given lower positions; this was largely due to the presence of fibers in these dusts which it was impossible to include in our counts.

4. The so-called organic dusts were invariably composed of both organic and inorganic materials, and the latter ingredient may account for the harmful influences which have been attributed to certain of these dusts.

5. The organic dusts averaged less than the inorganic dusts both in weight and in count of particles.

6. The percentage distribution of the different sized particles was curiously similar in all the samples, and it may be assumed that approximately half of all dust particles, that are countable by the method here employed, are about 1 micron in greatest diameter, the others ranging up to about 40 microns.

7. Dust removal at the point of production not only greatly decreases air dustiness, but particularly removes the smaller particles.

8. The substitution of wet processes for dry ones effectively lessens air dustiness.

9. Air dustiness varies inversely with relative atmospheric humidity, as does also the percentage of the larger dust particles.

Clinical Notes, Suggestions, and New Instruments

AN UNUSUALLY LARGE VESICAL CALCULUS

H. M. McCANDLISS, M.D., AND NATHANIEL BERCOVITZ, M.D., HOI HOW, HAINAN, CHINA

Oct. 30, 1917, a man aged 31, entered the hospital complaining of great pain on urination, with pain over the bladder. The patient had been in this condition for over ten years, gradually getting worse. When he came to the hospital, he could not stand erect on account of the pain.

The man was emaciated, and his face and body were covered with pit marks of old smallpox. A sound introduced into the urethra met at the neck of the bladder a solid, immovable body. This could be palpated 2 inches above the pubes. The urine showed an intense cystitis. An incision

Fragments of calculus.

was made above the pubes almost to the urbilicus and the bladder, which was distended with boric acid solution and opened. A large irregular stone was disclosed which was found to be impacted. Efforts to dislodge it proved fruitless, and finally a hammer and chisel were used to break it into fragments.

An outer shell from three-fourths to seven-eighths inch in thickness was first broken through anteriorly and removed. The nucleus of the stone, 2 inches long, 1½ inches wide, and 1 inch thick, was then removed. The posterior portion of the shell was now dislodged and removed. A mass of small fragments and débris was removed, and the bladder thoroughy irrigated, although a considerable amount of "sand" was adherent to the walls of the bladder and the edges of the wound. A catheter was introduced, and a large rubber tube drain left in the suprapubic opening, the incision being closed in the usual manner.

After thorough drying, the fragments that were recovered weighed 385 gm. It was found impossible to reconstruct the stone, but the accompanying illustration of the fragments gives an idea of its size.

The postoperative history has been uneventful, and at the date of writing (November 21), the suprapubic opening is almost closed. How many stones heavier than this one have been reported?

American Presbyterian Hospital.

Great Nations.—The greatness of a nation is to be judged by the number of the great men it has produced.—Keen.

Military Medicine and Surgery

SIMPLIFIED RULES FOR TUBERCULOSIS EXAMINATIONS

HENRY FARNUM STOLL, M.D. (HARTFORD, CONN.)
Major, M. R. C., U. S. Army; Instructor in Tuberculosis Examinations, Army Medical School; Tuberculosis Specialist, Walter Reed General Hospital
WASHINGTON, D. C.

In my instruction at the Medical Officers Training Camp at Fort Benjamin Harrison, and more recently at the Army Medical School, emphasis has been placed on certain points which seem especially essential to the thorough examination of the lungs. While none of these points are original, they do not appear to be so widely appreciated as their importance warrants.

These essentials I have arranged in groups of three in the hope that this will make it easier to remember them.

Because of lack of time, examinations in the Army must be made rapidly; but if systematically done, they will also be thorough. Therefore (1) system, (2) rapidity and (3) thoroughness characterize the work, the motto being "A maximum amount of information in a minimum of time."

ESSENTIAL POINTS

Always compare corresponding areas in.....	1. Inspection. 2. Percussion. 3. Auscultation.
For inspection, subject must	1. Sit erect. 2. Relax shoulder muscles. 3. Face the light.
One should look for....	1. Retractions (apical and over the hila). 2. Diminished expansion. 3. Lagging.
Signifying, respectively..	1. An old process. 2. An extensive process or adhesions. 3. Active disease.
For percussion one should	1. Exert very firm pressure with finger placed parallel with the ribs. 2. Employ a very light uniform stroke. 3. Percuss from below upward.
To study the breath sounds, the subject....	1. Breathes very quietly (mouth open). 2. Slightly more deeply. 3. Slightly more rapidly.
Be sure to.....	1. Note character of inspiration. 2. Length and pitch of expiration. 3. Study of the whispered voice.
Remember that normally at the right apex.....	1. Tactile fremitus is increased. 2. Percussion note is less resonant. 3. Expiration is somewhat prolonged and raised in pitch.
Activity is indicated by râles best elicitated thus	1. Expire forcibly. 2. Cough. 3. Inspire (moderately). (Save time by illustrating method.)
The characteristic râles are subcrepitant.....	1. Heard immediately after the cough at the beginning of inspiration. 2. Usually persist through the whole of inspiration. 3. With less active lesions, are heard only in the first part of inspiration; sometimes only during the cough.
Of especial significance are râles that are.....	1. In showers. 2. Localized. 3. Persistent.
They should be sought for with particular diligence in the.....	1. Supraspinous fossae. 2. Supraclavicular space ((*a*) inner, (*b*) middle, (*c*) outer portions). 3. First interspace near sternum.
Do not mistake for the râles of tuberculosis..	1. The inconstant apical râles at the end of forced inspiration. 2. Sternoclavical crackles. (Hold breath, rotate shoulder.) 3. Sternal and muscle sounds.
Do not consider tuberculosis the fine râles ("marginal sounds") heard over the lower lobes, especially in the anterior axillary line..	1. They are crepitant. 2. Begin in the middle of inspiration and attain their maximum at the end. 3. Dissipated by deep breathing.
Remember that.....	1. Lesions of apexes are usually tuberculous. 2. Lesions of base alone are usually not. 3. The most common cause of bronchovesicular breathing is noisy nasal respiration.
In military work.....	1. Make diagnosis for physical signs rather than symptoms. 2. Do not overlook the extensive but inactive lesions (retraction, dulness, breath changes, *no râles*). 3. Do not overlook small active lesions (no retractions, dulness or breath changes, *but râles*).
To minimize mistakes...	1. Reexaminations. 2. Sputum and roentgen-ray examinations. 3. Temperature and pulse records.

FURTHER EXPERIENCES WITH DAKIN'S DICHLORAMIN-T IN THE TREATMENT OF WAR WOUNDS*

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Major, M. R. C., U. S. Army
AND
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Captain, M. R. C., U. S. Army
FRANCE

In a previous report[1] on the use of Dakin's dichloramin-T in the treatment of war wounds, the simplicity of the technic, the great saving of pain, and the economy of time and surgical material were pointed out. We now present the results of a more extended experience with this antiseptic. We shall limit our report to our own service, although the same method has been used to a greater or less extent on the other three surgical services of this hospital and in an adjoining hospital.

We shall present the total number of the severe cases treated, classified in a general way. We shall discuss only our surgical failures, leaving the reader who is familiar with the conditions under which we are working to judge. Let it be stated for the reader not familiar with these conditions that our material is in no sense whatever chosen. It does not reach us within the first twenty-four hours, and the more important cases have all been surgically treated elsewhere; we take the wounds as they come, some clean, some infected, some foul. Wounds clean when they come to us stay clean; the infected and the foul wounds clear up, with the failures detailed below. As we are

* From 16 (Philadelphia, U. S. A.) General Hospital, B. E. F.
[1] Sweet, J. E.: Brit. Med. Jour., 1917, **2**, 249.

working in a general hospital, the length of time required for complete healing cannot be given; the patients remain here only until they are in condition fit for evacuation.

From July 7, 1917, until Oct. 25, 1917, we have treated in our own service, among other wounds, 680 cases of wounds of a severity sufficient to require evacuation to England. Of these, 30 were amputation stumps (not including amputations distal to wrist or ankle); 94 were compound fractures of the upper extremity, of which 40 were compound fractures of the humerus; 78 were compound fractures of the lower extremity, of which 27 were compound fractures of the femur; 31 were severe buttock wounds; 131 were severe wounds of the upper extremity, without fracture; 200 were severe wounds of the lower extremity, without fracture; 34 were severe flesh wounds of the back; 82 were severe miscellaneous wounds (head, face, neck, etc.).

From the standpoint of the theory of surgery, loss of life, or limb, or the endangering of life or limb by long continued sepsis and by secondary hemorrhage are failures.

We have lost twelve patients. Two died of anaerobic septicemia, and both were dangerously ill on admission. Two died from infected foreign bodies in the brain. One died of septic peritonitis six hours after admission. One died from bronchopneumonia twenty-four hours after admission. Two died of traumatic meningitis, from penetrating injuries of the lumbar portion of the spinal canal. One died of traumatic meningitis of the lower cord, from penetrating wound of the fourth lumbar, with epidemic cerebrospinal infection of the meninges of the brain. One died of septicemia, starting from a penetrating wound of the sacro-iliac joint, symptoms appearing twenty-four hours after admission. One died of pyemia, with abscesses in the lungs, starting from a compound comminuted fracture of the head and neck of the left femur. One died of edema of the lungs, with septicemia, membranous laryngitis, pharyngitis and tracheitis, probably a streptococcic throat infection that was independent of the wounds. These are condensed reports of the postmortem finding of the pathologist.

We have performed two amputations; in both instances patients were admitted with symptoms of simple gangrene due to the destruction of the vessels of the leg by shrapnel.

By long continued sepsis we mean the course so familiar to the older surgeons, with gradual undermining of the patient's general condition, loss of weight, loss of appetite, fever, diarrhea, bedsores, etc. We have had but one such case in this series; a wound of the knee joint, with history of the joint's having been cleaned out elsewhere, treated with bismuth iodoform paste, and the capsule and skin sutured. For about a week the patient did well; then infection began in the joint, and after a long and stormy period, combined with the opening of the joint and the removal of many fragments of bones, and three pieces of shrapnel from the neighborhood of the joint, the patient's temperature began to recede. Several patients on our service with empyema have shown long continued septic temperatures; but these hardly belong in this discussion, since they came to us with the infection developed, and were treated by drainage, not by dichloramin-T.

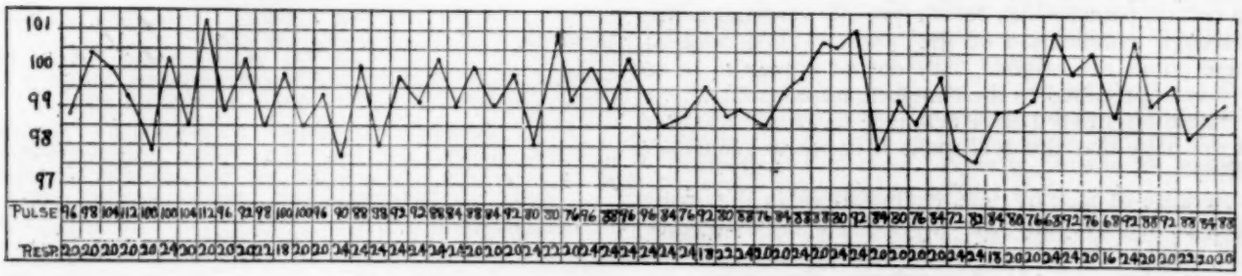

Chart 1.—Temperature, pulse and respiration chart for the first four weeks after admission of Private W. (2756), with a compound fracture of the femur involving the knee joint.

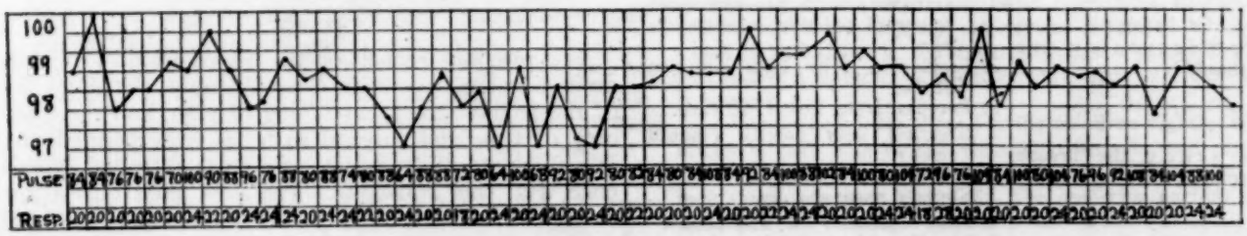

Chart 2.—Temperature, pulse and respiration chart for the first four weeks after admission of Private H. (29399), with a compound fracture of the femur.

We present the temperature charts for the first four weeks after admission of two compound fractures of the femur, the most severe cases we have had. Private W. was admitted dangerously ill, with a huge, foul wound of the lower thigh and extensive comminution of the lower third of the femur, the wound communicating through the suprapatellar pouch with the knee joint. Private H. was admitted in severe shock. Both were evacuated after eight weeks, with body union.

Secondary hemorrhages have occurred in the following cases:

1. A small wound of the temporal region, with severed temporal artery. The wound was concealed by the hair. It was not discovered for five days. Hemorrhage was trivial.
2. A compound fracture of the lower jaw. There were repeated hemorrhages until the dental surgeon could wire the jaw in place.
3. One of our two amputation stumps, necessitating ligation of the femoral.
4. A posterior tibial artery, torn by shrapnel, necessitating ligation just below the bifurcation.
5. A compound comminuted fracture of both bones of the left forearm. There were repeated hemorrhages until the patient's coincident septic pneumonia permitted a general anesthetic.

With the cooperation of Capt. E. B. Krumbhaar, M.R.C., U. S. Army, we have made bacteriologic studies of these and other wounds. We have practiced secondary closure in but few, since we believe that secondary closure represents a surgical problem that is not solved by the mere ability rapidly to sterilize a wound. We have made these studies in order to convince ourselves that the simple technic of dichloramin-T permits the sterilization of a wound as rapidly as can be accomplished by any other antiseptic, and that not only "clinical sterility," as represented by the counting of smears, but also bacteriologic sterility, as represented by negative cultures, can be attained by dichloramin-T.

We are not yet prepared, nevertheless, to subscribe to the dictum that secondary closure is always the best surgical practice.

One hundred and thirty-six examinations by smear or by culture or by both methods have been made of fifty-one wounds. Of these fifty-one wounds, thirteen were found to be sterile by culture on agar or egg plants; six were "clinically sterile," that is less than five organisms were to be found in twenty fields of a smear. Examination of twelve additional wounds by the smear method showed them to be "clinically sterile," but cultures made at the same time gave numerous colonies.

The length of time required for the sterilization of a wound will depend on the extent of the infection, and also, we believe, on the character of the microorganisms present; relatively clean wounds have been culturally sterile in eight days; foul, stinking wounds have required twenty-one days.

These results will be reported later in a discussion of the problem of the secondary closure of wounds.

NATURE AND TREATMENT OF WOUND SHOCK AND ALLIED CONDITIONS

[EDITORIAL NOTE.—The first three articles in the eries of six articles on this subject, which represent the work of the Special Investigation Committee of the Medical Resea ch Committee (Great Britain), appeared in The Journal last week, February 23, pages 520-535. The remaining three artic es appear in this issue. The complete series is reprinted as a pamphlet and will be sent on receipt of ten cents in stamps.]

THE INITIATION OF WOUND SHOCK

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Introduction

The name "wound shock" is suggested in order to avoid the confusion which arises, even among medical officers, if the word "shock" alone is used. The term "surgical shock" used in connection with the reaction of the body to wound injury is also to be deprecated.

Wound shock may supervene early on. That is, the man suddenly becomes pale, clammy and pulseless; and a low pressure may be found as soon as it is possible to make a reading, fifteen to twenty minutes after the man has been hit. To this group of symptoms with hypotension the name *primary wound shock* is given. When, on the other hand, as the result of a long carry in the cold or the onset of toxemia, or the presence of continuous slight hemorrhage, or combinations of these conditions, a man previously in good condition develops similar shock symptoms, a condition of *secondary wound shock* may be said to exist.

In order to understand more completely the later phases of fully developed wound shock, the necessity for making clinical studies of the earliest manifestations of the condition became more and more emphasized. Opportunities arose and facilities were granted by the army medical authorities for carrying out the requisite investigations. A series of posts were established along the route of evacuation from the firing line to the casualty clearing station. Suitable cases were chosen and examined, blood pressure readings taken, and notes made by medical officers interested in the work. A spring sphygmomanometer was used at each post. In a few instances the same observer followed the case for several miles, in order to watch the patient and check observations.

It was thus possible to collect a small series of cases and establish the exact time relations in the pressure curves of both primary and secondary wound shock.

Besides a study of the blood pressure, careful clinical notes were kept of all cases. In addition, a few hematocrit readings were made in the line and samples of venous blood taken for examination in the laboratory for acidosis.

A dynamometer was improvised from the spring blood pressure instrument in order to form an idea of the general muscular power and "tone" of the nervous system in these cases of hypotension.

Besides observations in actual wound cases, many pressure readings of officers and men in different parts of the line and under varying conditions were taken The facts observed during a tour of duty in the line in February, 1917, were confirmed and amplified.

Physiology of the Fighting Soldier

A good deal of light is shed on the pathogenesis of wound shock by a consideration of the conditions of life of the soldier in the zone of fire. In the case of

men living in the areas behind the trenches, where they are exposed to occasional shell fire, the conditions of food, drink, sleep, and shelter from the weather are practically normal. One finds an average systolic pressure of from 110 to 120 mm., with a diastolic of from 75 to 80 mm. and a pulse pressure of from 35 to 40 mm.

In the front line trenches, however, the conditions of existence are for the most part unfavorable. The soldier is subjected to long spells of hard physical labor, often accompanied by profuse sweating. Sleep is short, and generally interrupted. The food supply is sufficient, but water is very often available only as a limited ration. In the firing line and during battle all these factors become accentuated.

For a large part of the year, exposure to wet and cold must be taken into account. Thus the man, who may be hit at any time, is likely to be in a state of fatigue, with a tendency to concentration of plasma, sluggish peripheral circulation, and accumulation of waste products of muscular metabolism.

The urine of such men is dark, scanty, and loaded with phosphates.

Evidence has already been obtained which shows that in conditions of this kind at an exposed active sector of the line the average systolic pressure was a little above the normal, that is, from 120 to 130 mm. Pressures were found without excëption to be raised at times of increased activity, with the following average results: systolic pressure, from 140 to 160 mm.; diastolic pressure, from 70 to 100 mm.; pulse pressure, from 60 to 70 mm. Communication of the details of these observations must at present be deferred.

It is not possible to make similar observations in the heat of battle, but there is no doubt that these physiologic conditions are all present, only in a much greater degree, affording important prewound factors in the initiation of wound shock.

Classification of Wounds with Reference to the Incidence of Wound Shock.

From the point of view of the production of shock, the wounded may be divided into the three following classes:

A. Trivial wounds, which cause only slight damage to the tissues.

B. Moderately severe wounds, in which the anatomic disturbance disables the man, but is not sufficient immediately to endanger life.

C. Serious wounds which, from the nature of the injury, must of necessity prove mortal, or which will cause death unless the man is given surgical attention within a short time.

CLASS A. TRIVIAL WOUNDS

In these a transient psychic disturbance may occur, and the man become pale and sweat. But in three cases of fainting after being wounded, the pressure, which was taken as soon as possible after the recovery from the faint, was found to be normal. In men who are more "highly strung" an excitement stage may follow a trivial wound. For example, a boy 18 years of age, with very slight multiple superficial shell wounds, exhibited a systolic pressure of 180 mm. In this group of cases the question of temperament plays a prominent part. Examination was made of a party of slightly wounded men, belonging to a county infantry battalion, as they came back into the firing trench from a raid. The average systolic pressure was 110 mm.; only one man had a reading as high as 130 mm.; he was talkative and excited.

Apropos of this question, the experimental work of Cannon[1] and his co-workers on the physiology of excitement is very interesting and eminently applicable to the soldier in battle. According to this author, a definite series of psychologic events results from the application of suitable psychic stimuli. The main factor is the outpouring of suprarenal secretion, which helps to transform the animal into a fighting mechanism. The circulation is better maintained by the raised blood pressure; the heart and skeletal muscles can do more work with their increased supply of blood sugar, and in the event of a wound being received the coagulation time of the blood is so diminished that clotting occurs more quickly and the bleeding is staunched.

In the excitement cases the pressure subsides rapidly with quiet and rest. In the case of the boy of 18, it had fallen to 160 and 90 in thirty minutes and 126 and 80 in the next hour.

CLASS B. MODERATELY SEVERE WOUNDS

In this group are included those wounds which cause a certain degree of damage to the tissues, but either a vital organ is not involved at all, or, if such is involved, the damage is slight, as in a small perforating wound of the abdomen, and danger to life does not develop for some hours. In these cases primary wound shock does not as a rule occur. If the patient is examined within a few minutes where he fell, he presents no sign of general systemic disturbance, and the blood pressure remains within normal limits. After the lapse of a short time, however, and as a result of the operation of certain factors which are to a great extent avoidable, the symptoms of shock with hypotension appear, and the patient then shows secondary wound shock (Chart 1).

For example, a man (*a*) was hit by a shrapnel ball which fractured his femur. He was passing along the trench just outside the aid post at the time, and was treated by the medical officer at once. His pulse was 72 and pressure 120 and 80. Again, by a curious chance, a shell hit a house in which was a party of men (*b*), four of whom sustained compound fractures of the femur, without developing immediate shock. Another case (*c*) was observed in an outpost in the front line, when a bomb arrived which killed one man on the spot and wounded his chum. The foot of this man was partially shattered and his shoulders and neck sprinkled by little fragments. His blood pressure, which, as it happened, had been found to be 110 and 70 a short time before, remained unaltered.

One other example (*d*) of this class of case may be quoted, which possibly is exceptional, but which is nevertheless of interest. A strong, burly lance-corporal, a boxer of good reputation, was hit by a shell which carried away his left leg halfway between the knee and the ankle and also shattered his right foot. When seen, soon after, his pulse was 96 and systolic pressure 115 mm. Clinically, one would say none of the usual symptoms of shock were present. As the

1. Cannon: Bodily Changes in Pain, Hunger, Fear and Rage, New York, 1915.

pain was considerable, he was at once given a hypodermic injection of morphin, ⅓ grain, by the medical officer.

The immediate after history of these wounded men is instructive.

The man (*a*), with a compound fracture of the femur, who was hit outside the aid post, was warm at the time. He was put on a stretcher at once, well wrapped up, and sent down to the next post on the line of evacuation. On arrival here his pulse was 72 and pressure still normal. Since he was quite comfortable in his splint, he was kept several hours before being sent to the casualty clearing station, and developed no signs of shock.[2]

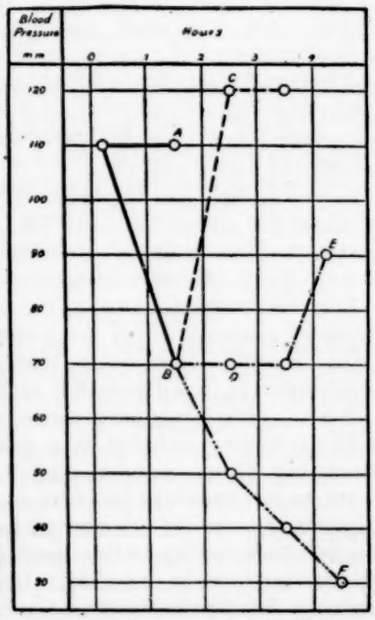

Chart 1.—Secondary shock curve; diagrammatic: In many wound cases the pressure will remain level (*A*). In others, as a result of hemorrhage or exposure to cold, there is a drop of pressure with the establishment of a secondary shock (*B*). If the patient is at this stage well cared for and the wound not too severe, the pressure will rise during the next stage of the journey (*C*) or remain stationary (*D*), improving after admission to the casualty clearing station (*E*). In the absence of favorable circumstances, the pressure goes steadily down and the case terminates fatally, usually in from twelve to twenty-four hours (*F*).

The four men (*b*), hit in the same house, were splinted at once and placed on a motor ambulance, which was driven at a walking pace to a casualty clearing station within half a mile. No shock developed, and all did well.

In the example of the man (*c*) hit by a bomb at the outpost, secondary wound shock developed. He arrived cold and pulseless at the aid post. Before he was hit he was cold, fatigued and thirsty; and during the carry of an hour and a half, exposed to the chill wind preceding dawn, he lost more heat. Fear, too, was probably superimposed as a factor in this case, since on the journey down the stretcher party was exposed to occasional shells and bursts of machine gun fire. A sound man feels moderately secure in the trenches because he can take cover; but a man who is already hit and is being carried along on a stretcher, shoulder high, feels helpless. At the next stage this man was still pulseless. Very soon after being admitted to the casualty clearing station, however, he was warmed; his pulse returned, and he did well without the exhibition of any antishock methods of treatment.

The boxer (*d*), with his leg blown off, also developed secondary wound shock. He did not manifest any lowering of tension on the journey from the trenches to the advanced dressing station, but on arrival at the casualty clearing station, about five hours after his being wounded, toxemia was beginning to develop, and the pressure had dropped from 114 and 70 to 88 and 62 mm.

Before leaving the second group of cases, another example of marked wound shock, but with quick recovery, may be mentioned. A young soldier (*e*) in a wiring party sustained two simple bullet wounds of the fleshy part of the thigh. It was a cold night. After being carried two hours, with no hemorrhage, he was found to be cold, thirsty and pale, with a pressure of 70 and 50 mm., and a small thready pulse of 68. He was given a hot drink and, after being warmed and well wrapped up, was sent off. At the next post his arterial pressure had risen to 120 and 80 mm., and remained at that level on arrival at the casualty clearing station.

CLASS C. SERIOUS WOUNDS

In the third group a serious surgical condition has resulted from the wounding. The wound shock comes on early, and apparently in proportion to the gravity of the lesion[3] (Chart 2).

In primary wound shock, very definite clinical symptoms may be observed. For example, the driver of an ambulance car was hit in the abdomen by a shell fragment as he arrived at the dressing station on a warm, sunny morning. He fell down, and within a few minutes, as his wound was being dressed, drew the attention of the medical officer to his profuse sweating. He was wrapped up in blankets, hot bottles were applied, and he was sent off. After thirty minutes' ride over a rough road, scarred by shell holes, he was found to be responsive to questions. He complained of pain, and presented cold, clammy extremities, with the sweating still marked. He was pale, with a pulse of 96 and a pressure of 100 and 70. On arrival at the casualty clearing station, about forty-five minutes later, the pressure had further dropped to

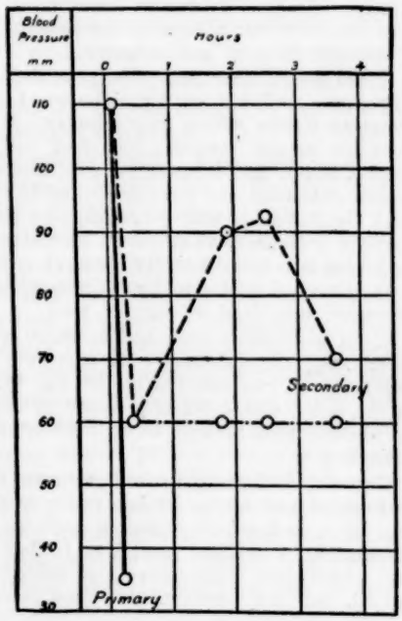

Chart 2.—Primary wound shock curves; diagrammatic: Following the receipt of a severe anatomic injury, where death must ensue or where life can be saved only by prompt surgical interference, instant shock appears accompanied by hypotension. This may be fatal in a short time. If all precautions are taken in the careful transit of the patient, the pressure may rise *en route* or remain level without further drop. After the lapse of a few hours the condition of primary wound shock merges into that of secondary wound shock unless recovery has first occurred.

2. There is little doubt that since the universal introduction of the Thomas splint for fractures of the femur, which has proved increased comfort to the patient and immobilization of the fragments of the bone, the incidence of secondary shock has been greatly diminished. Such patients used to arrive at the casualty clearing station with well established shock showing systolic pressures of 80 or 90 mm. or less. Similar cases now arrive with systolic and diastolic pressures of 130 and 90, 120 and 80, or even 160 and 100 in one case.

3. The only predetermining factor of any importance in the amount of shock which may result is the temperamental stability of the patient. This point is illustrated in some of the following cases.

82 and 70 and the pulse had risen to 100. Operation was performed in time to stop further hemorrhage. Ten rents in the bowel were repaired, and after intravenous infusion he eventually made a good recovery.

A few other examples of severe injuries with early wound shock may be quoted, in which circulatory disturbance predominated. In these cases, whenever the systolic pressure was found below from 60 to 70 mm., it was always a distressing symptom.

CASE 1.—A man on a working party was seen about forty minutes after being hit by a shell burst. He had sustained penetrating wounds of the chest, buttocks, legs and thigh, with fracture of the femur. He was cold, with a clammy skin; pulse 80, and blood pressure 60 and 50 mm. He complained loudly of thirst and pain. His sensation was normal, and as the antitoxin needle was inserted he cried out. Respiration was from 20 to 24, with no unusual characteristics. Morphin, ¼ grain, hypodermically, stopped the pain in a few minutes; and after a few hours' warming he was sent on with a pulse of 90 and pressure of 98 and 70.

CASE 2.—A young officer, of a nervous, irritable disposition, was hit in the dorsal region of the spine by a sniper just after dawn. Two hours later his blood pressure was 75 and 50, pulse 84, and all the signs of wound shock were present.

CASE 3.—A large, powerfully built gunner was seen within half an hour after being hit, one hot, sunny morning. The shell fragments had fractured his lower jaw and left femur. He was cold, sweating, pulseless and thirsty. The systolic pressure was about 30 mm. There was considerable hemorrhage. He was treated in the routine way and sent down. He improved for a time at the casualty clearing station, but eventually died of gas gangrene.

CASE 4.—Another man, hit by a shell while on a working party on a cold, wet, muddy night, was brought to the advanced dressing station within fifty minutes. He was found to have multiple severe wounds, including compound fractures of both a femur and a humerus, with laceration of the muscles. When examined, the wounds looked like dead tissues. There was no bleeding, and practically no capillary oozing. His systolic pressure was 40 mm. Mentally he was quite bright and responsive, so that the medical officer in charge of the case remarked on the patient's "wonderful fitness." The man, however, was dead within the hour.

CASE 5.—Another man had a severe wound of the buttock, penetrating the abdomen. He was seen a short time before death, about two hours after he was hit. He was pulseless at the wrist, with a blood pressure of about 30 mm., and was so restless that he had to be held on the stretcher by two orderlies.

CASE 6.—A thin, lightly built sergeant of anxious, worrying disposition was hit as he lay asleep at the foot of his dugout, by a shell which shattered both his feet. His company commander, a medical man, was fetched within two minutes and found him unconscious and pulseless. Both feet were pulped, but not bleeding. He died about an hour later.

The "grip," as recorded by the improvised dynamometer in those cases of profound hypotension in which it was possible to make this test of muscular power, was in all cases practically the same as for a normal man.

CONCLUSIONS

1. The psychology and physiology of the average healthy "veteran" soldier, living in the fighting zone under "peace" conditions are, for practical purposes, normal.

2. In battle and at points of activity, the conditions of excitement, cold, thirst, fatigue and possibly loss of sleep become important predisposing factors in the initiation of wound shock.

3. Wounds may be classified into three groups with regard to the incidence of shock.

Trivial wounds, such as slight scalp injuries or small lesions of subcutaneous tissues only, give rise to neither primary nor secondary wound shock. Transient psychic disturbances of either depression or excitement may result, accompanied by a normal or raised blood pressure.

In *moderately severe wounds*, such as uncomplicated compound fracture of the femur, a slight penetrating wound of the abdomen or a lacerating wound of muscle without urgent hemorrhage, as a rule, primary wound shock is absent, that is, if the patient is seen within a few minutes. If circumstances permit of sufficient care being taken, probably no untoward symptoms will arise, and secondary wound shock may be averted (Cases *a* and *b*).

As the factors of cold, toxemia, pain, anxiety or lack of water are allowed to come into play, however, there develops, after a lapse of several hours, secondary wound shock (Cases *c*, *d*, and *e*).

Into the category of *serious wounds* will fall a large group of cases in which the wound must of necessity prove mortal. Symptoms result immediately and hypotension is found from the earliest moments (Cases 1 to 6). This is primary wound shock. Such shock is likely to be produced to a greater degree in men possessing temperamental instability. After a few hours, unless recovery has first occurred, the condition of primary wound shock merges into that of secondary wound shock, owing to the operation of the same conditions, cold, pain, anxiety. In the slighter cases, recovery from primary symptoms is rapid (Case 1); but then exposure and the factors enumerated in B may come into play, and secondary wound shock become established.

Social Insurance Legislation in 1917.—From the *American Labor Legislation Review*, September, 1917, is abstracted the following information concerning social insurance and allied topics as acted on in the state legislatures during 1917. Workmen's compensation laws were enacted in Delaware, Idaho, New Mexico, South Dakota and Utah, and in twenty-six states amendments to existing laws were made. The tendency has been to extend the scope of the laws, to shorten the period at which compensation begins, and to increase the provision for medical care. Thirty-seven states and the territories of Alaska, Hawaii and Porto Rico now have compensation laws, and in addition legislation has been enacted in Congress for the benefit of government employees, along with the important provision for compensation and insurance for soldiers, sailors and civilian seamen and compensation for longshoremen. Other forms of social insurance were the subject of increased interest during the year. In California, after two years' investigation, the legislature has submitted to the people a constitutional amendment providing for a system of health insurance. Massachusetts, Pennsylvania and Illinois have continued or created commissions to study health insurance, and Pennsylvania has a separate commission to study old age pensions. New Hampshire created a committee to study workmen's compensation and health insurance together, Wisconsin covers social insurance generally, Connecticut is studying health and old age insurance, and Oregon and Idaho enacted legislation to regulate hospital funds. Arizona enacted a minimum wage law for women in private employment, being the twelfth state to pass such a law. Montana and Nevada established an eight hour limit for women, and Alaska passed a universal eight hour law. Congress empowered the President to suspend the eight hour law on government war work provided time and a half were paid. A few other states relaxed somewhat the laws relating to hours of labor.

A CONSIDERATION OF THE NATURE OF WOUND SHOCK

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INTRODUCTION

The previous papers of this series have consisted mainly of records of observed phenomena in cases of shock, with little discussion of their origin or significance. These observations, however, have suggestive values and are pertinent to theoretical aspects of the shock problem. A consideration of the bearings of our results on previous views of the nature of shock may bring out some new points and may be useful in directing further investigation into fruitful channels.

THE BEARING OF PRESENT WORK ON PREVIOUS THEORIES OF SHOCK

A. THE ACAPNIA THEORY

The thesis advanced by Yandell Henderson that shock is due to a reduction of the carbon dioxid of the blood (acapnia) has received much attention. In support of his view, Henderson[1] produced low blood pressure in animals by vigorous artificial respiration, and he assumed that the lowered carbon dioxid content of the blood thus induced was the prime factor in establishing the shocklike state. In all probability, however, the effect was due, not to reduction of carbon dioxid, but to mechanical obstruction to return of blood to the heart and to consequent failure of the circulation. Only by such extreme inflation of the lungs as would hinder the passage of venous blood through the veins of the chest were Janeway and Ewing[2] able to obtain the results described by Henderson, and they succeeded equally well when the normal carbon dioxid content of the blood was maintained.

Further doubt is thrown on Henderson's views by observations on the character of the breathing in wounded men suffering pain. Deep and vigorous ventilation of the lungs is required to produce a marked diminution of the carbon dioxid content of the blood. Cowell made a special point of looking for that type of respiration in recently wounded men, but did not see it. And in a man brought under my observation at the clearing station a few moments after he had been hit in the wrist by a bomb splinter, which was giving him much pain, explosive respirations, preceded by holding the breath, were going on at the rate of 12 per minute. From the evidence in hand it appears that painful wounds are not directly associated with a hyperpnea that would produce acapnia.

Recently Henderson, Prince and Haggard[3] have reported finding in animals experimentally shocked a condition of acidosis; and since the blood in this state has a reduced capacity for carbon dioxid, he has given the "acapnia" theory a new interpretation—the carbon dioxid is low because of the acidosis. The observations previously reported[4] confirm in human cases the evidence secured experimentally. Shock is accompanied by acidosis, and the ability of the blood to take up carbon dioxid is correspondingly reduced.

Henderson has raised the question, however, as to whether the alkali of the blood controls the carbon dioxid content, or the carbon dioxid content controls the alkali. Apparently reluctant to abandon his acapnia theory, he suggests that in shock, excessive breathing may greatly lower the carbon dioxid of the blood, and that as a protective compensation acidosis is developed to prevent the fatal apnea that might ensue from lack of stimulating H-ions. Again it is proper to emphasize the observation that such hyperpnea as would result in marked reduction of the circulating carbon dioxid is absent from wounded men. To be sure, the chlorin content of the plasma increases[5] as carbon dioxid leaves the blood, but as any one may easily demonstrate to himself, this is not a process of sufficient magnitude to prevent apnea after vigorous hyperpnea. Furthermore, in shock, acidosis, in the sense of a lessened alkali reserve, occurs before any noteworthy effect on respiration is manifest. These considerations render highly questionable Henderson's suggestion of a primary acapnia.

Henderson[3] and also Porter[6] have advocated rebreathing expired air as a means of improving the circulation in shock. Henderson's object is to maintain the carbon dioxid content of the blood in spite of an alkali deficit, with the idea that alkali may thus be mobilized and the circulatory apparatus benefited. Porter's object is to increase the amplitude of the movements of the diaphragm so that the sufferer who has bled "into his own abdominal veins" may pump the blood from this reservoir into the heart. The certain effect of the increase of the carbon dioxid in the blood is to increase the H-ion concentration. That this stimulates not only the respiratory center but also the vasomotor center was shown by Mathison.[7] The ability of the vasomotor center to respond to stimulation, even in profound shock, was proved by Porter[8] in 1908. That the increased arterial pressure obtainable by increasing the H-ions of the blood would be only temporary was to be expected. As one of Porter's cases shows, the raised pressure promptly fell to the former shock level as soon as the carbon dioxid administration stopped. The respiratory mechanism, of course, at once gets rid of the excess of carbon dioxid, the H-ion concentration falls, and the stimulus which raised the pressure is thereby reduced. There are possibilities of harm in this procedure, however, that should not be overlooked. As Milroy[9] has recently demonstrated, when the alkali reserve is reduced, exposure of the plasma to a given concentration of carbon dioxid increases the H-ion content to a much greater degree than is the case when the plasma is normal. Increase of the H-ion concentration interferes with cellular oxidation. If the patient rebreathes his expired air, the oxidative processes are further interfered with through diminished oxygen supply. Thus, nonvolatile acids may arise which fix the alkali and lead to a more permanent increase of the H-ion concentration of the blood. The state of acidosis which already exists in the shocked man may, therefore, be distinctly aggravated by the procedures advocated by Henderson and by Porter. In this connection the testimony of Marshall, who as an expert anesthetist in a casualty clearing station has

1. Henderson, Yandell: Am. Jour. Physiol., a series of papers, 1908-1910.
2. Janeway and Ewing: Ann. Surg., 1914, **59**, 158.
3. Henderson, Yandell; Prince, A. L., and Haggard, H. W.: Observations on Surgical Shock, THE JOURNAL A. M. A., Sept. 22, 1917, p. 965.
4. Cannon, W. B.: Acidosis in Cases of Shock, Hemorrhage and Gas Infection, THE JOURNAL A. M. A., Feb. 23, 1918, p. 531.
5. Hamburger: Osmostischer Druck und Ionenlehre, Wiesbaden, 1902., I, p. 264. See also Austin and Jonas: Am. Jour. Med. Sc., 1917, cliii, p. 86.
6. Porter: Boston Med. and Surg. Jour., 1917, **176**, 699; **177**, 326.
7. Mathison: Jour. Physiol., 1910, **41**, 430.
8. Porter: Am. Jour. Physiol., 1908, **20**, 404.
9. Milroy: Jour. Physiol., 1917, **51**, 279.

had large experience, is pertinent. He has declared that the most important consideration in anesthetizing patients suffering from hemorrhage or shock is to avoid anything in the nature of asphyxia; indeed, that if such a patient becomes cyanosed, he loses ground that can hardly be recovered. This warning is in accord with the contention that any action increasing acidosis is to be avoided.

B. THE IDEA OF SUPRARENAL EXHAUSTION

Since removal of the suprarenal glands results in lowered arterial pressure, and since secretion or injection of the extract of the suprarenal medulla increases the pressure, the idea has been advanced that in shock there is suprarenal exhaustion and consequent hypotension.[10] If the distinction which should be drawn between the effects on blood pressure of the medullary and cortical portions of these glands is for the moment disregarded, it may be pointed out that, according to Short,[11] who used a very delicate test, the epinephrin content of the glands in fatal cases of shock is not notably reduced. Furthermore, Mann[12] has reported that total excision of the suprarenals does not reproduce the phenomena of shock.

There is experimental testimony that painful stimuli and asphyxia increase both the secretion of epinephrin and the percentage of sugar in the blood, and that the sugar percentage does not rise if the suprarenal glands are not cooperative.[13] Persons suffering from wound shock have been severely stimulated, and the low blood pressure which characterizes their condition produces a state which is equivalent to partial asphyxia. Bedford and Jackson[14] and later Bedford reported finding the epinephrin content of the blood increased if the blood pressure is low. The high percentage of sugar found in our series of shock cases likewise indicates that the suprarenal glands are, if anything, overactive rather than exhausted.

C. THE NERVE EXHAUSTION THEORY

When observers noted that arterial tension is low in shock, the first suggestion offered was that relaxation of the arterioles had occurred, and in consequence there was no support for the head of pressure which the heart might otherwise develop. This view, long ago expressed by Mitchell, Keen and Morehouse, has been elaborated by Crile[15] in extensive investigations on the blood pressure and on the nerve cells in shocked animals. It is his belief that the most vital effect of shock is "the impairment of the vasomotor mechanism." The concept has been gradually developed that shock consists essentially of exhaustion of cells in the brain, the liver, and the suprarenal glands. Evidence that the suprarenals are not exhausted has been presented above. The theory of a primary exhaustion of nerve cells requires examination. It may be considered, first with regard to the vasomotor center, and then with regard to cerebral and motor functionings.

A lowering of arterial pressure is not proof that the vasomotor center is inactive or exhausted, for arterial pressure may be low in consequence of hemorrhage, that is, when only a small volume of blood is delivered to the heart for each contraction. Furthermore, even when an animal is in extreme shock, Porter[16] and his collaborators found that both pressor and depressor reflexes still occur. The occurrence of depressor effects proves that some tonic activity of the vasomotor center is still present, for otherwise its action could not be depressed; and the pressor responses show that the center is still capable of increased action when stimulated. These observations by Porter have been confirmed by Seelig and Lyon[17] and by Mann.[18]

Since the vasomotor center is not exhausted, the question arises as to its actual condition in shock. Recent experimental evidence points to its effective control of peripheral and visceral arterioles in the shocked state. Seelig and Lyon[19] found that cutting the nerve of a leg in a shocked animal caused an increased flow of blood from the femoral vein. Guthrie, in confirming this work, observed that whereas the increase of flow in a normal animal was 22 per cent., in a shocked animal it was 76 per cent. Later, Seelig and Joseph[20] noted that if in a shocked rabbit the blood pressure was suddenly raised by clamping the aorta, the blood greatly distended the arteries of one ear whose nerves had previously been cut, but failed to distend the arteries of the other ear whose nerves were still connected with the vasomotor center. In other words, the center was still holding the vessels in effective contraction. Similar observations have been made by Mann[21] on internal organs. And a number of investigators have reported that in an animal with low blood pressure the rate of perfusion flow is less with a given pressure than in a normal animal, and that severance of the nerves to the organ or increase of the blood flow to the vasomotor center increases the rate.[22]

Moreover, the studies of Pike, Guthrie and Stewart[23] have revealed the fact that the vasomotor center is more capable of withstanding the adverse influences of anemia than any other of the vital bulbar centers—the respiratory, the cardio-inhibitory or the swallowing mechanisms. Its capacity to function is the last to disappear in total anemia, and the first to reappear when the blood flow is restored. Obviously, the vasomotor center should be regarded as an agent whose functions are extremely stable and whose capabilities for continued service are its most outstanding feature. Only endangering circumstances, such as lessened blood supply, are required in order to make it become, for a time at least, more than usually active.

In this connection it is interesting to observe that not infrequently in cases of profound shock, when a pulse cannot be felt at the wrist, it can be felt easily if the palpating fingers are moved up the arm where the arteries are larger, or applied over the carotid. Fraser has repeatedly noted while operating on shocked men such strong contraction of outlying arteries that no bleeding occurred when the vessels were cut.

The evidence from functional disturbance that parts of the nervous system other than the centers controlling the circulation are *exhausted*, in any strict sense

10. Corbett, J. F.: The Suprarenal Gland in Shock, The Journal A. M. A., July 31, 1915, p. 380.
11. Short: Lancet, London, 1914, **1**, 131.
12. Mann, F. C.: Shock During General Anesthesia, The Journal A. M. A., Aug. 4, 1917, p. 371.
13. Cannon, W. B.: Bodily Changes in Pain, Hunger, Fear and Rage, New York, 1915, pp. 69-77.
14. Bedford and Jackson: Proc. Soc. Exper. Biol. and Med., 1916, **13**, 85-87. Bedford: Am. Jour. Physiol., 1917, **43**, 235.
15. Crile: Volumes on Surgical Shock; Blood Pressure in Surgery; Anoci-Association.
16. Porter: Am. Jour. Physiol., 1907, **20**, 399.
17. Seelig and Lyon: Surg., Gynec. and Obst., 1910, **11**, 146.
18. Mann: Bull. Johns Hopkins Hosp., 1914, p. 208.
19. Seelig, M. G., and Lyon, E. P.: The Condition of the Peripheral Blood Vessels in Shock, The Journal A. M. A., Jan. 2, 1909, p. 45.
20. Seelig and Joseph: Proc. Soc. Exper. Biol. and Med., 1914, **12**, 49.
21. Mann: Bull. Johns Hopkins Hosp., 1914, p. 209.
22. Morrison and Hooker: Am. Jour. Physiol., 1915, **37**, 93. Pilcher and Sollmann: Ibid., 1914, **35**, 59, 70. Bayliss: Proc. Roy. Soc., London, 1916, **89**, 391.
23. Pike, Guthrie and Stewart: Jour. Exper. Med., 1908, **10**, 499.

of that term, is meager. Even when the blood pressure has been much reduced, the intelligence remains clear, the patient may be restless rather than somnolent, and often exhibits surprising muscular power. Cowell reports no reduction of the strength of grip in shock; and he observed a wounded man, pulseless, with a systolic pressure about 30 mm., who was so vigorous in his movements that two orderlies were required to hold him on the stretcher.

The evidence for exhaustion which has been advanced by Crile[24] and his co-workers is mainly histologic, and is based on examination of nerve cells taken from shocked animals. It is improbable that these changes are due directly to afferent impulses, for Forbes and Miller,[25] by use of the string galvanometer as an indicator, found that anesthesia blocks the passage of impulses to the brain. The suggestion is reasonable that any cell alterations that may occur in shock are the resultant of the low blood pressure rather than its cause. Indeed, Dolley has admitted that hemorrhage produces the same alterations in the cells that are seen in shock. Crile's testimony that, if the blood pressure is kept up by transfusion into the shocked animal much more severe trauma is required to alter the cells than when shock takes its natural course, is further testimony to the same interpretation. It should not be forgotten, however, that histologic evidence regarding the state of nerve cells is subject to grave mischances both in technic and in interpretation. And other observers who have examined nerve cells from shocked animals declare that the changes are within the limits of normal variations.[26]

Differences in the appearance of nerve cells from separate parts of the nervous system might be regarded as indicating a definitely directed agent, such as nerve impulses, rather than a general agent, such as low blood pressure, at work to induce changes. The differences are explicable, however, on the ground that nerve cells are differentially sensitive to anemia, and by exposure to an inadequate circulation they would be differentially affected.[27]

The interpretation of cell changes as the result rather than the cause of shock points to a clear distinction which should be drawn between early and late indications of asthenia in shocked men. Though the vasomotor centers may for a time be normally active or even hyperactive, and the neuromuscular mechanisms may be ready for service, continuance of low blood pressure and the development of an acidosis which interferes with internal respiration will surely have deleterious influences, and ultimately will destroy the hardiest and most resistant structures. It is when these adverse conditions have brought to the point of exhaustion organs which are of vital importance that death occurs.

The Cardiac Factor

The foregoing discussion of the exhaustion theory has emphasized the evidence that the low pressure of a shocked man is not due to relaxation of the arteries through paralysis or inactivity of the vasomotor center. The other important factor in maintaining the arterial head of pressure is the heart. As has been often observed, the heart characteristically beats rapidly in shock and after hemorrhage.[4] The suggestion has been offered that the rapid beat is due to paralysis of the cardio-inhibitory center, but Mann[28] found that in the shocked animal the center is responsive to reflex stimulation and also to increase of intracranial tension. The nervous check on the heart, therefore, is not impaired. Indeed, the rapid cardiac beat with hypotension is precisely what is to be expected according to the reciprocal relation which commonly prevails between heart rate and arterial pressure.

That the heart muscle is not defective in shock has been shown experimentally. Raising the arterial pressure to a high level by epinephrin does not overwhelm the heart; when properly supplied with blood, it meets the situation and contracts with vigor. Low arterial pressure, however, if prolonged, may incapacitate the heart, for Markwald and Starling[29] have found that when the systolic pressure falls below 80 mm. of mercury, the cardiac contraction begins to weaken. And Patterson[30] has shown that when the H-ion concentration of the blood increases (by increased carbonic acid), the heart relaxes more and more and beats less energetically. The low blood pressure and the acidosis of shock, therefore, may in time impair the efficiency of the organ, though no primary defect be present.

The Problem of the "Lost Blood" in Shock

If the vasomotor center is efficiently at work, and if the heart is capable of assuming any reasonable burden placed on it, why is there a low arterial pressure in shock? The answer to this question lies in the diminished volume of blood which is in active circulation. Henderson, especially, has laid stress on the necessity of a sufficient supply of blood being delivered to the heart, if arterial pressure is to be kept at its normal level. In the absence of this supply, as, for example, after hemorrhage, the arterial pressure falls to a low level and can be raised only by introducing blood or other viscous fluid into the vessels.

A further question now arises, one of the critical questions in the mystery of shock, "Where is the lost blood in the shocked individual?" There are no indications that it is in the heart or lungs; it must be, therefore, in systemic arteries or capillaries or veins.

In the arteries?

The absence of the lost blood from the arteries is sufficiently proved by the facts already discussed. With an efficient vasomotor center and a capable heart, an adequate amount of blood in the arteries would be accompanied by high arterial pressure. That the pressure is low, as already stated, signifies that the heart is not supplied with enough blood to fill the arterial system.

In the veins?

The view commonly held in the past has been that in shock, blood is stagnant in the large venous reservoirs of the chest and abdomen, and especially in the capacious splanchnic area. "In shock," it is said, "the sufferer bleeds into his own abdominal veins." It appears that this view is based largely on evidence from experiments which has been rather uncritically accepted. The most certain way to produce shock in a lower ani-

24. Crile: Anoci-Association, Philadelphia, 1913, passim. Dolley: Jour. Med. Research, 1909, p. 95; 1910, p. 331.
25. Forbes and Miller: Am. Jour. Physiol., 1916, **40**, 503-513.
26. Allen: Proc. Soc. Exper. Biol. and Med., 1915, **12**, 76. Kocher, R. A.: The Effect of Activity on the Histologic Structure of Nerve Cells, THE JOURNAL A. M. A., July 22, 1916, p. 278.
27. For discussion see Cannon and Burket: Am. Jour. Physiol., 1913, **32**, 347.
28. Mann: Bull. Johns Hopkins Hosp., 1914, p. 210.
29. Markwald and Starling: Jour. Physiol., 1913, **47**, 275.
30. Patterson: Proc. Roy. Soc., London, 1915, B, **88**, 394.

mal is by exposure and manipulation of the intestine. Under these circumstances the mesenteric veins stand out prominently, blood gathers in the intestinal walls, and becomes more concentrated there, and the structures that have been freely handled appear as if inflamed.[31] In other words, blood obviously stagnates in abdominal vessels. Such a condition is not seen in natural shock. According to Keith,[32] the venous cistern, formed by the big veins of the chest and abdomen, has a capacity of 400 or 550 c.c. Mann[33] has found that the amount of blood that can be obtained by bleeding and by emptying the heart of normal animals is 76 per cent., leaving 24 per cent. "in the tissues." When animals are shocked by exposure of the intestine the amount left in the tissue rises to 39 per cent., a difference of 15 per cent. If the blood mass of a man of 70 kg. is taken as 3,500 c.c., the amount thus "lost" would be 525 c.c. If this blood were in the veins of the abdomen, systemic or splanchnic, their capacity would have to be greatly enlarged, and their distention would be clearly visible.

Surgeons of extensive experience at casualty clearing stations in the present war, who have performed many hundreds of abdominal operations on patients in all degrees of wound shock, have testified that on opening the abdomen they have not found any primary splanchnic congestion.[34] The method employed to produce shock in lower animals, which has repeatedly called attention to the abdomen and its peculiar circulation, has given rise to misleading inferences as to what occurs in natural shock brought on by wounding other regions than the abdomen.

If the lost blood were in the systemic veins, furthermore, it should be possible promptly to remedy the condition of a shocked individual by placing his body in a slanting head-down position, bandaging the limbs, and compressing the abdomen. Such measures have been thoroughly tried in treating shock, and though perhaps in some cases helpful, they do not give results which indicate that the blood which is out of circulation is stagnant in the large venous channels.

The fact should be remembered that veins are to a considerable extent subject to vasoconstrictor impulses; and if conditions are such as to continue the activity or to induce an overactivity of the vasoconstrictor center, the veins as well as the arteries might be contracted. Venomotor nerves have not been demonstrated for all parts of the body, however, and if there are veins free from nervous control, other influences causing relaxation might prevail. Only slight dilation, perhaps too little to be conspicuous, would be needed to increase considerably the venous capacity. But there are no observations that the veins are even slightly dilated in shock.

IN THE CAPILLARIES?

If in wound shock the lost blood is not in the arteries and probably not to a great amount in the veins, it must be mainly stagnant in the capillaries. Observations reported in a previous paper[35] have shown that in shock a striking discrepancy exists between the corpuscular content of the capillaries and the veins. There is a concentration of the blood and a stagnation of the corpuscles in the capillaries which can be demonstrated in such widely separated parts as the ears, the fingers and the toes. The discrepancy is, to be sure, more marked in superficial areas than in deeper regions; but even in the latter a noteworthy difference is found.

The question immediately occurs, Is the capillary capacity sufficient to contain the lost blood in shock? Unfortunately, the data for estimating the capillary capacity are not definitely established, and it is impossible to state with any assurance what amount of blood these vessels may contain. Ranke inferred from determinations made on freshly killed rabbits that approximately one fourth of the blood is in the heart, lungs and great blood vessels, one fourth in the liver, one fourth in the resting muscles, and one fourth in the remaining organs.[36] The large proportion of the blood, about 75 per cent., which is outside the heart, lungs and large veins and arteries, seems to indicate an abundant capacity in the small vessels lying within the tissues. On the other hand, an estimation of the capacity of the capillaries, based on the inverse ratio between the rate of flow and the cross-section, yields a rather small volume for capillary contents. The most favorable ratio of the rate of flow in the aorta and in the capillaries, stated by Tigerstedt,[37] is 2,000:1. The cross-section of the aorta of an adult man is about 4.4 sq.cm.; that of the total capillary bed, on this basis, would be (4.4 × 2,000) 8,800 sq.cm. The average length of a capillary is given as 0.05 cm. The total capacity of the capillary system, therefore, would be only about 440 c.c. This calculation does not take into consideration, however, the fact that capillaries are not all full of blood. Heubner[38] observed after injecting sodium gold chlorid the sudden appearance of new capillaries in the frog's web, so that a coarse mesh was quickly changed to a fine one. And Worm-Müller[39] was convinced that the only way to account for the ability of the circulatory system to accommodate itself to injection of large amounts of blood was to assume a utilization of capillaries not ordinarily filled. He cited the difference of appearance of the intestine when at rest and when digesting, the phenomenon of blushing and the redness of the inflamed skin as illustrating the idea that the capillary net may contain much more blood than it usually contains. The *distensibility* of the capillaries also should be considered, for Roy and Brown[40] noted that chloroform could double the diameter of capillaries (thus quadrupling their capacity). Still another consideration which is pertinent to the conditions in shock is the *concentration* of the capillary blood, as shown in a previous paper,[35] which means a retention mainly of corpuscles in the capillaries. All these facts appear to warrant the conclusion that the capillary capacity is sufficient to contain the lost blood in shock, and that the chances of its doing so are greater the more concentrated the lost blood becomes.

The observations previously reported[35] indicated that the capillary blood may be concentrated to such an extent that a cubic millimeter contains 8 million instead of 5 or 6 million corpuscles. An equal concentration does not occur in all parts of the body. The observa-

31. Morrison and Hooker: Am. Jour. Physiol., 1915, **27**, 93. Mann: Surg., Gynec. and Obst., 1915, **65**, 380.
32. Keith: Jour. Anat. and Physiol., 1908, **62**, 1.
33. Mann: Surg., Gynec. and Obst., 1915, **55**, 380.
34. Statement by Wallace, Fraser and Drummond: Lancet, London, 1917, **2**, 727.
35. Cannon, W. B.; Fraser, John, and Hooper, A. N.: Some Alterations in the Distribution and Character of the Blood in Shock and Hemorrhage, THE JOURNAL A. M. A., Feb. 23, 1918, p. 526.
36. Vierordt: Anatomische, Physiologische und Physikalische Daten und Tabellen, Jena, 1893.
37. Tigerstedt: Physiologie des Kreislaufes, Leipzig, 1893, p. 423.
38. Heubner: Arch. f. Exper. Path. u. Pharmakol., 1907, **56**, 375.
39. Worm-Müller: Ber. ü. d. Verhandl. a. k. Sachs. Ges. d. Wissensch., 1873, **25**, 650.
40. Roy and Brown: Jour. Physiol., 1879, **2**, 375.

tions of Cohnstein and Zuntz,[41] however, suggest that when blood pressure is lowered (by cutting the spinal cord) a capillary stagnation occurs to such an extent as to pack the vessels closely, while the venous blood quickly falls in corpuscular content (a drop of about a million corpuscles per cubic millimeter in ten minutes). Lowering of blood pressure by spinal section will in itself, on this evidence, induce a stasis which can be clearly seen under the microscope, and is observable in both surface and internal capillaries.[42]

The Viscosity Factor

There are other conditions besides a low blood pressure that are favorable to capillary stagnation of the corpuscles. These are concerned with alterations in viscosity. The viscosity of the blood is complex, consisting, as it does, of the internal friction of the plasma, the friction of the corpuscles with the plasma and with each other, and the frictional contacts of the corpuscles with the vessel walls, especially in the capillaries.

A prime factor affecting the viscosity of blood is the number of corpuscles per unit volume. The polycythemia of cholera, for example, may cause the viscosity of the blood to rise from 4.8 to over 20.[43] Cohnheim[44] attributed the low blood pressure in cholera to a failure of the blood to return to the heart, owing to the enormous increase of frictional resistance that is caused by concentration. The concentration of the corpuscles in the capillaries would, in itself, render the friction greater, and increase the resistance to an onward movement.

Another agent affecting the blood's viscosity to a notable degree is temperature. The increase of internal friction is related directly to a fall of temperature. Denning and Watson[45] found that viscosity of blood was increased 3 per cent. with a fall of 1 degree Centigrade, and that the temperature factor was more effective the larger the number of corpuscles present. Even in normal persons, application of cold increases the red count in the cooled capillary areas. Cowell's observations on recently wounded men have shown that a prompt and striking reaction to the injury is profuse sweating.[46] One of the most effective modes of lowering body temperature is through evaporation of sweat; indeed, it is the only way of losing heat when the surrounding temperature is equal to or exceeds that of the body. Normally, as the surrounding temperature falls, sweating ceases and heat is lost by radiation and conduction. In the shocked man exposed to cold all three processes are going on; and the clothing, wet with sweat or rain, permits the loss by conduction to be much augmented. Thus the surface is liable to be speedily cooled, and soon the whole body is affected. It is common for the body temperature (buccal) to be below 95 F., and readings as low as 87 and 88 have been noted in shocked men. Of course, the skin and extremities are much colder.[47] According to Cowell's observations shivering is rarely seen under these conditions. The heat loss, therefore, is not compensated for by heat production.

The increase of viscosity due to cold is not to be regarded as the only factor leading to capillary stagnation; it is probably not sufficient by itself to have that effect. Possibly cold affects capillary walls in a way leading to greater friction. Hough and Ballantyne[48] have reported a rise of capillary pressure in cooled parts of the body, together with lessened conspicuousness of the veins, and they suggest that contraction of muscles in the venules may check the outflow from cooled capillary areas. However loss of heat may operate, the evidence is clear that it results in concentration of blood in capillary areas; and this factor, added to the effect of low blood pressure, would favor segregation of the corpuscles in the capillaries. Significant in this connection is the commonly observed greater incidence of shock in cold weather, and especially when the cold is accompanied by rain, so that clothing is wet through. Likewise significant is the fact that as a wounded man becomes chilled his blood pressure falls, and as he is warmed his blood pressure may rise again.[46]

In addition to concentration of corpuscles and lowered temperature as conditions increasing the viscosity of the blood, there is the influence of an increase of H-ions. I have already[4] dealt with the existence of acidosis in cases of shock. Since there is evidence that acidosis has other effects than merely on the corpuscles, its influence will be considered in some detail.

The Effects of Acidosis on the Circulation

In all probability, the lowering of the alkali reserve in cases of shock and hemorrhage is due to a fixed union of the alkali with acids, which, unlike carbonic acid, do not pass off in the lungs. The production of such acids is known to occur when oxidation is interfered with. A low blood pressure with slow circulation, cold, and corpuscular stagnation would all cooperate to check the normal oxidative processes of the body, and to increase the production of intermediary acid metabolites. Emphasis should be kept on the fact that these metabolites would be more concentrated in the tissues, and in the perivascular fluids than they would be in the blood, for they must diffuse from their source in the cells into the circulating stream. Thus, though the alkali reserve in the blood may not be reduced to a degree which would indicate a considerable increase in the H-ion concentration, the H-ion concentration in stagnant capillary regions must be still higher. And if the reserve in the blood is greatly reduced and the H-ion concentration is much raised, still greater concentration must exist in the tissues. In addition, if the tissue fluids are cooled, they will be still more acid; for, as L. J. Henderson[49] has pointed out, the alkalinity of the body fluids decreases as the temperature falls. The acids thus developed in the tissues and affecting first the capillaries and small veins, with their corpuscular contents, might have effects on the circulation which would augment the action of low pressure, concentration and cold as considered above.

1. There is evidence that acid or change in the blood in the direction of acidity may have depressive effects on the *blood pressure*. Thus Hooker[50] observed that carbonic acid in minimal effective amounts always

41. Cohnstein and Zuntz: Arch. f. d. ges. Physiol., 1888, **42**, 326.
42. These observers did not consider possible dilution of the blood by tissue fluids, and they transferred the observations on capillary stagnation in the frog to explain the conditions they found in the rabbit. The importance of the results, in relation to the nature of shock, warrants a careful repetition of the experiments under more critical conditions.
43. Bence: Ztschr. f. klin. Med., 1906, **58**, 203.
44. Cohnheim: Lectures in Pathology, London, 1889, **1**, 466.
45. Denning and Watson: Proc. Roy. Soc., 1906, **78**, 318.
46. Cowell, E. M.: The Initiation of Wound Shock, THE JOURNAL A. M. A., this issue, p. 607.
47. Weil: München. med. Wchnschr., Sept. 11, 1917.
48. Hough and Ballantyne: Jour. Boston Soc. Med. Sc., 1899, **3**, 330.
49. Henderson, L. J.: Am. Jour. Physiol., 1908, **21**, 441.
50. Hooker: Am. Jour. Physiol., 1912, **31**, 58.

causes relaxation of vascular muscle. And Gaskell,[51] and also Bayliss,[52] proved that other acid, for example, lactic, which results from inadequate oxidation, has the same effect as carbonic acid. According to Severini's[53] studies, both microscopic and physiologic, the capillaries also are dilated by carbonic acid. Barcroft[54] has measured the increase of acid in blood coming away from the submaxillary gland after it had been stimulated to secretion by epinephrin, and accounts for the greater flow of blood through the gland, when thus made active, by the local dilator effects of the acid metabolites. As acid develops in tissues poorly supplied with oxygen, the blood vessels locally affected by these acids might reasonably be expected, on the basis of the foregoing evidence, to undergo relaxation.

An antagonistic factor is found, however, in the action of H-ions on the vasomotor centers. Oxygen lack, increase of carbonic acid in the blood, or injection of weak organic acids, all of which increase the H-ion content, stimulate the vasomoter center and cause a rise of blood pressure.[55] Thus, in acidosis with increased H-ions in the blood, vessels under nervous control would be subjected to impulses which would cause them to contract. This evidence harmonizes with that presented earlier, that in shock the arterioles are in constriction. Probably most veins are likewise involved in the subjection to nervous discharges. The capillaries, however, would be affected by the local increase of H-ions, and being dilated would be capable of holding an extra amount of blood. Some veins, likewise, might be relaxed. Thus capacity for the lost blood would be provided in the small vessels of the tissues rather than in the large venous trunks.

2. Increase of the carbonic acid of the blood affects *cardiac contraction*. As previously noted, Patterson[30] has shown that when the H-ions are increased by this means, cardiac muscle relaxes to a greater extent during diastole and contracts less forcibly in systole, so that the output is diminished. This condition again would tend to result in further impairment of the circulation.

3. Increase of carbonic acid increases *the viscosity of the blood*. Bence[43] reports that by breathing an atmosphere rich in carbon dioxid, the viscosity of the blood may be increased by from 25 to 52 per cent., and according to Ferrai's[56] experiments, asphyxiated blood has a viscosity approximately double that of oxygenated blood, the increase rising as the carbonic acid content rises. This factor would cooperate with low arterial pressure, concentration of corpuscles, and cold, as agencies operating to produce stagnation of corpuscles in capillaries.

4. Hamburger[57] has noted that the *size of corpuscles* is increased by the action of carbonic and other acids. The change need be only a slight one to produce demonstrable results, as, for example, when the arterial blood becomes venous. If the arterial blood contains an excess of H-ions, it would deliver to the systemic capillaries enlarged corpuscles. Corpuscles stagnant in regions ill supplied with circulating blood, where acid metabolites are most concentrated, would be especially subject to enlargement. In some of our hematocrit readings we found that the capillary corpuscular volume was greater compared with the venous corpuscular volume than it should have been according to the ratio of corpuscular and venous counts. The discrepancy was greatest in severe acidosis. The larger corpuscles might find obstruction to their progress where smaller corpuscles would not, and in any case might raise the viscosity of the blood.

All these effects of increasing the H-ions of the blood—relaxation of vessel walls (especially the capillaries), weakening of cardiac contraction and increase of blood viscosity—would be favorable to a continuance of low blood pressure. It seems probable, therefore, that when acidosis is once established, it would tend to continue the disturbances of the circulation which have been produced by other conditions.

Vicious Circles in Shock

In relation to the observations and inferences discussed above, it is of interest to consider some of their interrelations. In all probability a number of vicious circles would be started which, if not interrupted, would lead to an aggravation of the already existent abnormal state, and which would account for the progressive nature of fatal shock. The following possibilities may have suggestive value:

1. The retarded blood flow in cooled capillaries would result in a lessened supply of heat to the regions of stasis; the parts would thus become still cooler; the cooling would increase still further the viscosity of the blood, and thereby the blood flow in the capillaries would be still further retarded.

2. Increase in the *number* of corpuscles per cubic millimeter increases the viscosity; thus the more the blood concentrates in some of the capillaries the more friction would there be in driving the corpuscles through them, and consequently a still greater accumulation in these capillaries might be expected.

3. As more blood accumulates in capillary areas, less is returned to the heart; the arterial pressure in consequence continues to fall, the force driving the blood through the capillaries is thereby progressively lessened, and the tendency for blood to gather in the capillaries where the passages are narrowest and the friction greatest is continuously augmented.

4. As the blood pressure falls, the "head" normally in the arteries is largely lost and becomes insufficient to maintain the circulation equally in all parts of the body; the blood would be forced through capillaries in which resistance is slight rather than through those in which it is increased; the blood flow in cooled, clogged capillaries, as those of the limbs, would thus tend to be gradually diminished, with resultant greater stasis.

5. An increased H-ion content of the blood lessens the rate and the amount of union of oxygen with hemoglobin,[58] and a lowered temperature (in cooled tissues) lessens the rate of dissociation of the oxygen; a diminished oxygen supply would interfere with cellular oxidation, and thus increase the amount of fixed acid in the blood; this in turn would check the oxidative processes in the cells and interfere with heat production; in consequence, through cooling and greater acidosis, the abnormal state would be made worse.

51. Gaskell: Jour. Physiol., 1880, **3**, 66.
52. Bayliss: Jour. Physiol., 1901, **26**, xxxii.
53. Severini: Ricerche sulla Innervazione dei Vasi Sanguini, Perugia, 1878, p. 96; La Contractilita dei Vasi Capillari, Perugia, 1881.
54. Barcroft: The Respiratory Function of the Blood, Cambridge, 1914, p. 154.
55. Mathison: Jour. Physiol., 1910, **42**, 283.
56. Ferrai: Arch. di fisiol., 1904, **1**, 385.
57. Hamburger: Osmotischer Druck und Ionenlehre, Wiesbaden, 1902, **1**, 296.
58. Barcroft: The Respiratory Function of the Blood, Cambridge, 1914, pp. 27 and 53.

6. As arterial pressure falls and acid accumulates in the blood, the kidneys, because of the low pressure, become less and less active; fixed acid consequently accumulates still further in the blood, and the disturbing condition is thus augmented.

Doubtless there are still other ways by which the abnormal factors may interact so as gradually to lessen the chances of recovery for the shocked individual. All these deranging processes, however, require appreciable time for their operation. It is important, therefore, that the treatment of shock be prompt, and directed toward preventing an increase of the unfavorable conditions.

Shock as "Exemia"

The view developed in the foregoing discussion that in shock the circulatory difficulty is due to loss of blood from circulation, though not from the body, is one which has been growing in recent years, as experimental data have accumulated. The general condition was first reasoned out by Malcolm,[59] and later the idea was greatly elaborated by Henderson,[60] both of whom supposed that the lost blood was gathered in the veins. Still later, Mann[33] expressed the same idea, declaring that in shock there is a loss of circulatory fluid at a point beyond vasomotor control. And more recently the idea has been generalized for various shocklike states, traumatic and toxic, and the suggestion offered that capillary concentration might occur.[61] In all these states the essential feature appears to be a draining or holding back of blood from normal currency.

This view of "shock" is so different from that which probably gave reason for the original use of the term—a sudden collapse due to a severe wound—that a more descriptive name seems needed. The general employment of the word "shock" for a variety of meanings, as, for example, emotional shock, shell shock, concussion shock, besides traumatic or surgical and toxic shock, points likewise to the need of a new designation. The word *exemia* was employed by Hippocrates and signifies "drained of blood." As the discussion presented above has indicated, such is the condition in the shocked man who has not bled—his blood pressure is low because essential parts of the circulatory system have been drained of blood. The term *exemia* may properly be used to describe this condition.

A Concept of the Development of Shock or Exemia

Although an addition to the already numerous theories of shock seems uncalled for, the facts presented in the present series of papers may be worthy of an attempt at correlation in a general statement. These facts may be listed as follows: There are primary wound shock with rapid lowering of arterial pressure, and secondary wound shock with toxemia and hemorrhage, and later lowering of the pressure. Sweating occurs, leading to loss of fluid and loss of heat from the body. The blood becomes stagnant and concentrated in the capillaries, and as the blood pressure falls there is loss of the alkali reserve of the blood (acidosis) roughly corresponding to the drop in pressure. After the discussion in the foregoing pages, how may these facts be set together consistently?

Primary wound shock—dusky pallor; rapid, thready, low tension pulse; hypotension; sweating; thirst, and restlessness—may come on so soon after injury as to be accounted for only as the result of nervous action. The organization of the individual (for example, a "high strung" temperament), fear and fatigue probably provide favorable conditions for the nervous response. Cowell's observation of fainting after slight wounds may perhaps be regarded as a transient state which in true shock is more persistent. Sweating and exposure lead to rapid loss of heat from the body; previous sweating, wetness of the clothing, and low external temperature favor the process. Inactivity of the wounded man and absence of shivering lessen heat protection. Thus the body becomes cold, especially the surface and extremities. In consequence of the low blood pressure, aided by the chilled tissues, there is a stagnation of corpuscles in the capillaries. The onward flow here checked undergoes concentration, so that the capillary red count is high. Prolonged lack of fluid and sweating may favor the stagnation and further concentration of the blood. The low arterial pressure can continue a flow through easy channels, but is insufficient to maintain the normal flow where resistance is high. Thus cooled regions receive less heat from the interior of the body and tend to become cooler, and thus in turn more blood accumulates. By accumulation in capillaries the return of blood to the heart is lessened until a persistent low blood pressure becomes established. The blood lost from currency produces a state equivalent to hemorrhage. Any true hemorrhage therefore exaggerates the existent shock (exemia).

When a wound has not caused a primary fall of blood pressure, but has rendered the control of the circulation unstable, unfavorable conditions, such as cold, hemorrhage and toxemia, will bring about the same sequence of events that is seen in primary shock.

As the low blood pressure continues, the alkali reserve of the blood is reduced (acidosis). Previous starvation and fatigue would favor the development of acidosis. This state, by locally relaxing vessels which are not under nervous control, by weakening cardiac contraction, and by increasing the viscosity of the blood, tends to make worse the dangerous condition which has been established. And, as pointed out in an earlier paper, the individual with acidosis is sensitized so that operation, because still further increasing the acidosis and still further lowering blood pressure, becomes hazardous.

This conception of the events that take place in a wounded man who passes into shock gives a reasonable account of the primary effect of wounds, the influence of cold in continuing the low blood pressure or inducing it when the circulatory apparatus is unstable, the influence of warmth in restoring him in part to a fit condition, and the slowness of a full recovery. It leaves unsettled the occasion for the primary fall of pressure, though the suggestion is offered that it may be of reflex character, similar to fainting. The conception offers a hopeful outlook for the care of the shocked man, because two of the most potent factors making his chances unfavorable, cold and acidosis, can be controlled.

59. Malcolm: Tr. Med. Soc., London, 1909, **32**, 274.
60. Henderson: Am. Jour. Physiol., 1910, **27**, 152.
61. Medical Research Committee, London: Memorandum upon Surgical Shock, Brit. Med. Jour., March 24, 1917. Janeway and Jackson: Proc. Soc. Exper. Biol. and Med., 1915, **12**, 193.

THE PREVENTIVE TREATMENT OF WOUND SHOCK

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INTRODUCTION

Whatever the nature of the bodily changes which underlie the state of shock, it is evident that the circulatory functions are in a precarious condition, and that the heart, nervous system and other organs are suffering from an insufficient blood supply. Everything should be done to promote the factors favorable to restoration of a normal and stable blood flow, and anything unfavorable to such restoration should be scrupulously avoided. There are certain practices, such as the prompt arrest of hemorrhage, the lessening of sepsis by appropriate dressings, and the reduction of pain by suitable splints, by the judicious use of morphin, and by careful transport, that are generally recognized as important measures in the care of a wounded man who is shocked or liable to shock. Besides these there are other precautions which are suggested by observations reported in the foregoing papers.

In previous papers of this series, evidence has been afforded, among others, on the following points:

1. Cooling of a person in shock is attended by a further lowering of an already low blood pressure or by continuance of the pressure at a low level.

2. Surgical operation performed on a person in shock is accompanied by a rapid and large increase of an acidosis which is already present, and by a correspondingly sudden and extensive fall in an existent low arterial pressure.

These two sets of changes are both harmful, and may turn the slender chances of a shocked man definitely away from safety and into disaster. The dangers of both cooling and surgical operation, however, can be dealt with in ways which will lead to their avoidance. The protection of the wounded man against conditions which would develop or increase shock offers, we believe, the greatest hope for his recovery.

In the following account are presented suggestions, based on preceding papers,[1] for the prevention and early treatment of wound shock and for the preparation of the shocked man for surgical operation.

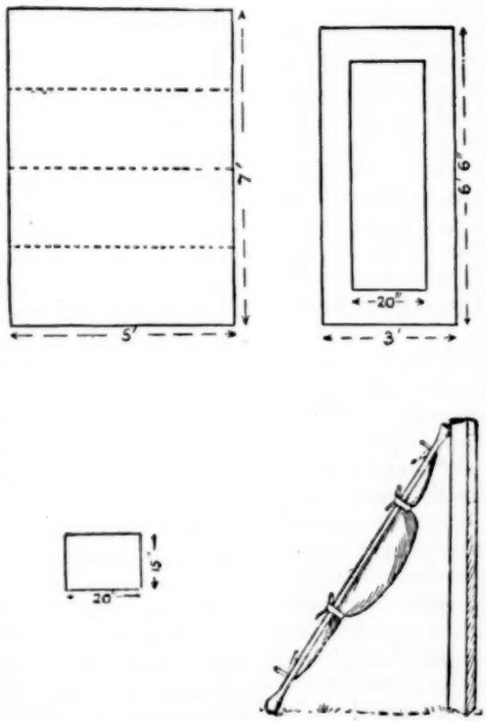

Fig. 1.—Method of carrying a dry blanket.

THE PREVENTION AND EARLY TREATMENT OF WOUND SHOCK

The reader will recall that of the three classes of wounds, Class B, those of moderate severity, may, through the effects of cold, hemorrhage and toxemia, develop into secondary wound shock; and that Class C, those of such severity as to endanger life unless early surgical treatment is given, show primary wound shock. Without proper care the case of secondary shock may be unnecessarily fatal, and with care the patient with primary shock may be tided over a critical period and brought to a casualty clearing station in a still operable condition.

The actual carry along the line of evacuation will vary greatly, according to the military situation and to uncontrollable circumstances, such as the weather, for example. The average wounded man on the Western front passes through the hands of several relays of bearers and at least three or four medical officers before he reaches a clearing station. Stretcher carrying along narrow trenches in the dark is laborious and slow work, even under good weather conditions. Bad weather doubles or quadruples the time required for the first stages of the journey.

If a man is hit in the front line trenches he may be at least one or two hours' journey away from the regimental aid post. And a man in a working party, a little farther back, may be as far away from the advanced dressing station. The observations recorded in the article on the initiation of wound shock have shown that it is in this stage of the journey that secondary wound shock develops, and that one of the chief factors in its initiation is loss of body heat.

To send blankets to all parts of the line is impossible, but by the adoption of a waterproof sheet-blanket "packet" system a stretcher prepared for use is provided with means for preventing excessive loss of body heat. Reference to Figure 1 will make clear this simple method of carrying a dry blanket. This method has already been put into practice in a large part of the line.

All regimental stretchers at advanced bearer posts in the front line, and stretchers carried by working parties, should be equipped with this packet. The regimental bearers should be insistently instructed by their medical officer as to the importance of doing everything to prevent wound shock. The wounded man should be guarded as much as possible against loss of heat. Efficient first-aid should be given rapidly without unduly exposing the patient to the cold for a prolonged period. A hot drink should be given at the earliest moment. Then, having been carefully wrapped up, the patient should be carried down with all speed to the regimental aid post. A well trained, intelligent orderly might be entrusted to give a tablet of morphin (one-fourth grain) by mouth in cases of severe pain.

1. Cannon, W. B.: Acidosis in Cases of Shock, Hemorrhage and Gas Infection, THE JOURNAL A. M. A., Feb. 23, 1918, p. 531. Cowell, E. M.: The Initiation of Wound Shock, this issue, p. 607.

A note of this treatment should be made in the usual way.

At the *regimental aid post* it is wise to consider the general condition of the patient first and his wound second. A dry stretcher with three blankets should always be in readiness for a possible case at any time of the day or night. In the properly equipped aid post there will be a constant source of heat, such as can be supplied by any good type of small closed stove or a small open brazier with a flue to carry off coke fumes. Space will be limited; but an open stretcher, together with three blankets folded lengthwise three times, may be kept supported horizontally against the wall of the dugout behind the stove. A dry stretcher and a supply of warm blankets will thus always be at hand. A tin of water may be kept standing on the fire to provide for hot drinks and for filling hot-water bottles.

As soon as a patient arrives he should be given a few ounces of hot drink, and his wet boots and puttees removed, along with any other clothing which may cover wounds. Meanwhile the dry stretcher is prepared by arranging the first two blankets so that four folds will come underneath the patient (Fig. 2). The blankets are covered temporarily with a waterproof sheet to prevent soiling while wounds are being dressed. The man is now transferred to this prepared stretcher, which is supported on trestles and stands well over the stove. The third or free fold of each of the lower two blankets hangs down on either side and helps to form an enclosed warming chamber. If there is no constant source of heat, a hot air chamber may be made in a few minutes by use of a Primus or Beatrice stove.[2]

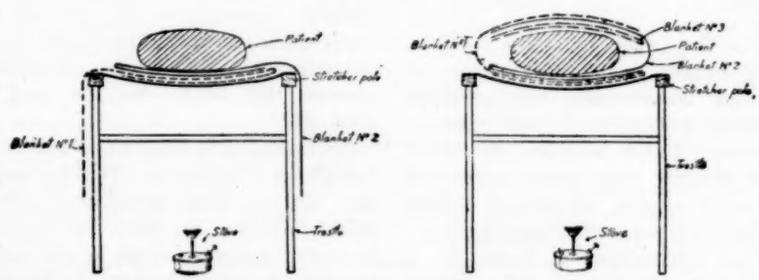

Fig. 2.—Method of folding three blankets to give four folds above and below the patient; also the formation of a hot air chamber.

The patient is now becoming warmed, while the medical officer is attending to the surgical cleansing of the wounds and neighboring parts, and is applying proper dressings and splints. As soon as the dressings are finished, well guarded hot water bottles are placed in each axilla and a third across the loins or between the legs; and the third blanket, which is doubled lengthwise, is laid over the patient. The two warmed blankets which have been hanging to form the sides of the hot air chamber are lifted, carried over the patient, and tucked in. He now has four folds of blanket over him as well as underneath.

Finally, just before the patient is sent off, he is given a hot drink of sweetened tea in which a dram of sodium bicarbonate is dissolved.

At the *advanced dressing station* the warming process with the Primus stove may be repeated, but usually without changing the stretcher and blankets. Meanwhile, any necessary treatment is carried out. Before the patient is sent on, a hot sweetened alkaline drink is administered as described above, and a fresh set of hot water bottles is put in place.

The next stage of the journey is usually undertaken by means of some mechanical transport, such as a narrow gage railway or a motor ambulance. The cars are at present warmed, so that there is a lessened chance of loss of body heat on the final stages of the journey.

At the *clearing station*, application of warmth should be emphasized as the most important part of the treatment in all serious cases. While the patient is being undressed and made ready for operation, he should be put over the same hot air chamber as has already been described. Electric warming apparatus, to be set over the patient, is at hand to apply as soon as he is ready, but it will not permit handling and treatment as will the heating from below.

While operating, again, every care must be taken to prevent loss of heat, even in summer. An electrically heated operating table is invaluable.

Modifications of Treatment in Battle Conditions

The outlines of early treatment, sketched in the preceding paragraphs, apply to such conditions on the Western front as are "normal" for the greater part of the year. In battle, the early exposure to cold will not be so important in most cases. But, as a result of previous fatigue and loss of body fluid by sweating and hemorrhage, together with the establishment of infection and the onset of toxemia, secondary wound shock develops. Whereas the appearance and degree of primary wound shock depend on the degree of damage done to a vital organ, secondary wound shock is proportionate to the length of time the pernicious factors are allowed to work—in other words, to the period during which the wounded man is "lying out."

In the rush of dealing with large numbers, it will be impossible in the line to attend to all the details described above. Large drafts of hot sweet tea made alkaline with sodium bicarbonate can, however, be easily provided, and should be given whenever the shocked patient complains of thirst at the dressing station or at any other suitable point on the way down to the clearing station.

Protection Against the Effects of Surgical Operation

Evidence presented in an earlier paper showed that the acidosis which prevails in cases of low blood pressure is associated with such sensitization of the body that surgical operation may result in a serious increase of the acidosis and a perilous sinking of the blood pressure. The question as to the causal relation between low pressure and acidosis has been discussed, and it appears that the two conditions may interact, each contributing to the development of the other. Under these circumstances, advantage would be gained by protection against each of the conditions—first, against the development of the sensitizing acidosis, and, secondly, against the increase of acidosis and the further fall of blood pressure which occur at operation.

2. A Primus stove of ordnance pattern will burn a gallon of paraffin in twenty-four hours if operating continuously.

PREOPERATIVE PROPHYLAXIS

In the acidosis of diabetes, Asiatic cholera, nephritis and other pathologic states, the urine can be rendered alkaline by administration of sodium bicarbonate by mouth, as has been shown by Sellards,[3] Palmer and Henderson,[4] and other observers. The change in the reaction of the urine implies an abundance of available alkali in the blood. The possibility of fortifying the body against a reduction of the alkaline reserves in surgical cases was demonstrated by Caldwell and Cleveland.[5] They gave sodium bicarbonate by mouth and found that the normal reserves can be so increased as to avoid wholly the drop in carbon dioxid capacity that occurs in the period preparatory to operation, and also to reduce by half the rate of drop that takes place during operation. The degree to which available alkali can be provided by giving sodium bicarbonate by mouth in cases of shock and gas infection is shown in the following case:

German *Unteroffizier* H.—Admitted, August 15, with wounds of both buttocks, but in good condition. The next day the pressure was low (78 and 56), and the carbon dioxid capacity 48 per cent. Alkaline drink had been started and was continued at two-hour intervals. On the second day the wounds were evidently extensively infected with gas, but the blood pressure was 102 and 66, and the blood had a carbon dioxid capacity of 61 per cent. In spite of operation, the infection spread and death resulted.

The results obtained in the foregoing case confirm the results obtained by others in showing that by administration of sodium bicarbonate the alkaline reserves of the body can be greatly increased even in unfavorable circumstances. Since acidosis develops in shock and involves a definite risk when operation is undertaken, its avoidance should be sought. The recommendation is offered that wounded men be provided with a warm drink containing a dram, or 4 grains, of sodium bicarbonate at suitable relay posts on their way from the front to casualty clearing stations, as indicated in the first section of this paper.

OPERATIVE PROPHYLAXIS

When a wounded man, badly shocked, is brought to a clearing station, he commonly must be operated on in spite of a low blood pressure and its attendant acidosis. The lapse of time when a man is in this condition gives opportunity for the extension of infective processes which gravely menace his chances. The surgeon has to choose, therefore, between an operation when the risk is serious, and a delay during which toxemia may develop to a menacing degree.

The low blood pressure of shock has been met hitherto by the injection of normal or hypertonic salt solution, or by combinations of salt solutions and gum. There is no doubt that in some cases such injections have had definitely beneficial effects. As shown in the previous papers, part of the pathology of shock is due to a loss of fluid from the circulation and consequent concentration of the blood. The injection of salt solution adds fluid to the body and improves the circulation, so that the concentration is soon abolished,[6] and the viscosity of the stagnant blood lessened. In such cases, however, the degree of acidosis had not been determined, and injection of physiologic sodium chlorid solution or Ringer's solution makes no provision against such critical turns as have been encountered during operation or shortly thereafter in consequence of increased acidosis.[7] Not only does ordinary salt solution fail to combat acidosis, it actually *increases* an already existent acidosis. Milroy[8] has recently shown that hemorrhage results in a loss of reserve alkali, and that then injection of sodium chlorid solution alone causes a *greater* H-ion concentration of the blood exposed to a given pressure of carbon dioxid than was present before the injection.

What is wanted is a fluid that will have the advantages already demonstrated for salt solutions — thinning of concentrated blood, lessening of viscosity and increase of blood flow with restoration of arterial pressure — together with antagonism to the state of acidosis. Such a fluid is found in sodium bicarbonate solution. Howell[9] observed years ago that alkaline injections (sodium bicarbonate) into a vein or into the rectum raised a systolic pressure of 60 or 70 mm. permanently to the normal level, and caused a marked increase in the force of the heart beats. If the pressure was lower (from 20 to 30 mm.) it was raised to 60 or 70 mm. Also the effects were relatively permanent, lasting one or more hours. These observations were confirmed by Dawson.[10] Either intravenous or intrarectal injections of sodium bicarbonate can restore the alkali reserve and abolish an existent acidosis.[11]

Injection of a fluid that will increase blood pressure has dangers in itself. Hemorrhage in a case of shock may not have occurred to a marked degree because blood pressure has been too low and the flow too scant to overcome the obstacle offered by a clot. If the pressure is raised before the surgeon is ready to check any bleeding that may take place, blood that is sorely needed may be lost. Fortunately, the injection may be made at the start of operation, just after the patient has been prepared and when the surgeon is ready to stop any hemorrhage, and it may continue as the operation proceeds.

The fluid that was injected in the cases recorded below was a 4 per cent. solution of sodium bicarbonate. Since 1.5 per cent. sodium bicarbonate is approximately isotonic with the blood plasma, the 4 per cent. solution is rather strongly hypertonic. It had previously been employed, however, in treating cases of diabetic coma,[12] and if introduced slowly (at the rate of an ounce a minute), it causes no noteworthy alteration of the blood. The fluid should, of course, be delivered to the body at approximately body temperature — it may be a few degrees warmer, but should not be colder, than that. If the solution is passed through a tube of considerable length before it enters the vein, it should have a temperature maintained between 110 and 115 F.

The boiling of sodium bicarbonate in solution changes it to sodium carbonate. Since the bicarbonate should be injected, it should not be boiled. The solution should be made just before it is to be used, by

3. Sellards: Philippine Jour. Sc., 1910, **5**, 313; Bull. Johns Hopkins Hosp., 1912, **23**, 289.
4. Palmer, W. W., and Henderson, L. J.: Clinical Studies on Acid Base Equilibrium and the Nature of Acidosis, Arch. Int. Med., August, 1913, p. 153.
5. Caldwell and Cleveland: Surg., Gynec. and Obst., 1917, **25**, 22.
6. Cannon, W. B.; Fraser, John, and Hooper, A. N.: Some Alterations in the Distribution and Character of the Blood in Shock and Hemorrhage, THE JOURNAL A. M. A., Feb. 23, 1918, p. 526. Cases 65 A and 60 A.
7. Cannon, W. B.: Acidosis in Cases of Shock, Hemorrhage and Gas Infection, THE JOURNAL A. M. A., Feb. 23, 1918, p. 531.
8. Milroy: Jour. Physiol., 1917, **51**, 277-279.
9. Howell: Am. Jour. Physiol., 1900, **4**, 14.
10. Dawson: Am. Jour. Physiol., 1904, **10**, 35.
11. Milroy: Jour. Physiol., 1917, **51**, 278-281.
12. Peabody: Am. Jour. Med. Sc., 1916, **151**, 198.

the addition to warm sterile water the proper amount of the sterile salt.[13]

To inject the solution it is usually not necessary to lay bare a vein and introduce a cannula. If a small rubber tube is drawn around the upper arm as a tourniquet and held by a looped twist (not so tightly as to obstruct the arterial flow, which, it will be noted, has a low pressure), the veins in the elbow will in most cases become sufficiently prominent to permit a hollow needle to be introduced into one of them. The lumen of the needle should be large enough to permit a pint of the bicarbonate solution to pass in fifteen or twenty minutes when the head of pressure is only 2 or 3 feet. A glass reservoir marked in ounces permits a judgment as to the proper rate of flow. As soon as the needle enters the vein, an outflow of blood through the lumen gives evidence. When the blood thus appears, the tourniquet should be pulled loose, the rubber tubing full of the solution should be connected with the needle, and the flow allowed to start. In some few cases the veins are so obscure as to make this procedure difficult or impossible; in that case the needle or a small cannula must be inserted into the bared vessel.

The following cases illustrate results which have been obtained when the solution of sodium bicarbonate has been injected in the manner described above:

Private R. M., wounded 9:30 p. m., September 24, sustaining a compound fracture of the left tibia and fibula, and a wound of the hand, was admitted, 11:30, September 25, with severe gas infection of the leg; temperature 96; blood pressure, 96 and 50. Operation was begun at 12:40; the carbon dioxid capacity, 40 per cent. One pint of sodium bicarbonate solution was injected. Operation ended at 1:25; blood pressure, 100 and 60; carbon dioxid capacity, 63 per cent. The pressure was lower in the afternoon (4:30), 74 and 46, but the next morning it was 112 and 66, and it did not again fall below normal limits.

Private J. B. was admitted, September 24, with a gunshot wound of the head (three deep lacerations), contusion of left eye, fracture of both bones of the left leg, and the left foot blown off. Unconscious from cerebral injury. Blood pressure at 11:35, 54 and 20. Operation begun at 11:47; carbon dioxid capacity, 42 per cent. One pint of sodium bicarbonate solution was injected. Operation ended 12:22; blood pressure 112 and 40; carbon dioxid capacity, 58 per cent. The patient lived until the evening of the next day, and died without regaining consciousness.

Private F. B. was admitted, September 9, with one foot mangled and wounds of the right thigh and right shoulder. Wounded at 3:30 a. m.; at 11:30 a. m., just after admission, temperature 98.4, pulse 144, blood pressure 75 and 46; sweating, thirsty, face and lips pale. Operation begun at 2 p. m.; pulse 144, blood pressure 72 and 42, carbon dioxid capacity, 36 per cent. One pint of sodium bicarbonate was injected. Operation ended at 2:40; pulse 120, blood pressure 104 and 50. At 11:30 the pulse was 110, but as the patient was asleep the pressure was not taken. The next day (9 a. m.), pulse 98, blood pressure 128 and 70. Gas infection required removal of leg in the afternoon. The patient stood the operation well, and made a smooth recovery.

Private H. H. was admitted, October 3, with the left foot blown off; he had lost much blood. The pulse was thready and rapid. Operation was started at 5:10; systolic pressure 62; diastolic pressure unreadable; carbon dioxid capacity, 42 per cent. One pint of sodium bicarbonate solution was injected. Operation ended at 5:40; blood pressure 62 and 46; pulse slow and easily palpable. The next morning (9:30), pulse 96, blood pressure 104 and 72. The patient recovered.

Private F. W. was admitted, September 26, with a compound fracture of the left thigh and a wound of the left hand. Wounded 11 p. m., September 25. At 4 a. m., September 26, just after admission, temperature was 96.6, pulse 132, blood pressure 98 and 70. Operation was begun at 4:50; carbon dioxid capacity, 34 per cent. Pressure fell to 82 and 50, pulse 160. One pint of sodium bicarbonate solution was injected. At 5:35, blood pressure was 110 and 85, carbon dioxid capacity, 68 per cent. At 9:15 a. m., blood pressure 124 and 90, and at 4:30 p. m., pulse 120, blood pressure 128 and 98. A smooth recovery followed.

Sometimes a patient apparently in a condition fit for operation becomes badly shocked as the operation proceeds. The following case illustrates the use of the bicarbonate solution in such circumstances:

Private D. was wounded by shrapnel at 10:30 a. m., September 19. He complained of sweating within less than five minutes of being hit. Seen by Cowell at 11 p. m.; pulse 96, blood pressure 104 and 70; cold, pallid, sweating. Admitted to the clearing station at 11:45; blood pressure 82 and 70, pulse 96, temperature 96. At operation ten large tears of the small intestine were found, and much blood in the abdominal cavity. At the end of operation the blood pressure was unreadable. One pint of sodium bicarbonate solution was injected; blood pressure rose to 85 and 60. In the evening the pressure was 86 and 60. The following morning it was 82 and 60, and the patient was in excellent condition. That evening the pressure was 102 and 80. On the next morning, September 21, the pressure was 112 and 90. The recovery was uneventful.

The foregoing cases show that an alkaline injection at the start of anesthesia prevents the dangerous depressive effects which the anesthetic and operative procedures have in cases of shock with acidosis. The operation ends, not with an increase of the existent acidosis, but with the acidosis overcome and a normal alkaline reserve provided. And the blood pressure, instead of being perilously lowered, is actually raised during the critical period. The blood pressure may fall to some extent later, but the improved state of the patient during operation is unmistakable, and the subsequent course of shock cases in which operation has been performed with the precautions described above has been highly gratifying.

In concluding this series of papers, we take pleasure in expressing our thanks to Col. Cuthbert Wallace, C. M. C., A. M. S., and to Col. T. R. Elliott for facilitating arrangements to carry on the work and for counsel; to Lieut.-Col. Winder, R. A. M. C., for cooperative interest; and to the Medical Research Committee and the American Red Cross in France for instruments used in the investigations.

13. An ideal injection fluid for shock cases would be a solution with colloid added, as Bayliss (Proc. Roy. Soc., 1916, **89**, 380) has suggested, for example, one containing sodium bicarbonate in proper amount and 6 per cent. gum acacia. (See further Bayliss: Injections to Replace Blood, Memorandum 1, of Reports of the Special Investigation Committee on Surgical Shock and Allied Conditions, Nov. 25, 1917.) Unfortunately, the gum contains calcium, which precipitates as calcium carbonate as sodium bicarbonate is added. If this precipitate is filtered out, the solution has the advantages of being both alkaline and viscous. The Medical Research Committee is preparing to provide in bottles sterile solutions of 6 per cent. gum, to which 2 per cent. sodium bicarbonate has been added, and the deposit filtered out.

Work for Health in Bureau of Mines.—During the year ending June 30, 1916, according to the Year Book of the Bureau of Mines for that year, 62,693 miners visited the mine rescue cars and stations, 43,060 attended lectures and safety demonstrations, 285 received mine rescue training, 5,598 were given both first aid and mine rescue training. The total number trained was 9,493, which is an increase of 494 over the previous year. The work has been popular and many requests have been received for instruction by the bureau. The casualty insurance companies have recognized the value of the bureau's first aid and mine rescue training by reducing their rates for any mine that has a certain number of men trained by the bureau.

Special Article

GASTRO-INTESTINAL EPIDEMIC AT PEORIA, ILLINOIS

(By Our Special Investigator)

During the week beginning February 18, the city of Peoria, Ill., was visited by an epidemic of intestinal trouble affecting a large number of people. This number was variously estimated at 3,000, 10,000 and 20,000. Certain it is that nearly every family was attacked, and sometimes every member of the household suffered. Cases began to develop on the 18th, Monday, the epidemic reached its height on Wednesday and Thursday, and then gradually subsided—a comparatively few cases appearing as late as Monday, February 25.

The most universal symptom was an acute diarrhea, appearing with no warning. This was accompanied in many cases by vomiting, some fever, abdominal tenderness, puffing of the arms, hands and cheeks, and backache. Fainting was reported in some instances. Attacks were as a rule brief, patients entirely recovering in from twenty-four to forty-eight hours. Only one death was reported, that of a baby who had previously had malnutrition troubles, but who actually died from a gastro-intestinal attack. An investigation into the probable source of the epidemic was undertaken by your correspondent, February 24 and 25.

Peoria is a city of from 75,000 to 80,000 inhabitants. Many of the surrounding towns are closely connected with Peoria in both a business and a social way, and were involved to some extent in this epidemic. Serving as the distributing center for food over a considerable district, the city is in close touch with the large food concerns of Chicago. The milk supply comes from fifty or more small dairy farms in the vicinity, is not pasteurized, and is not under a very strict supervision of the health authorities at the present time.

The water comes from a series of wells sunk near the Illinois River. The main well is 60 feet deep and 34 feet in diameter, and at the present writing is about 100 feet from the river. Five other wells are nearby, the cupola tops of some of them being surrounded by water. The other wells are farther up the river and about a quarter of a mile inland. These are newer wells, are 90 feet deep and 7 feet in diameter, and your correspondent was informed that the present supply was being drawn from the main well together with the latter wells, used alternately. The pumping station is near the main well. Water is pumped for the most part directly into the mains. A reservoir of 18,000,000 gallons' capacity serves to control the pressure and as a reserve supply in case of fire or other emergency which might tax the capacity of the pumps. The water company is privately owned, has about 13,800 services, 56 per cent. of which is metered, and supplies a population estimated at 96,000, including outlying districts as well as the city proper. Some manufacturing plants have their own well water supplies, but are connected also with the city mains. It was stated that the valves separating the two supplies were periodically examined by the water company and had always been found in good condition. The wells yield plenty of water, as high as 20,000 million gallons a day having been pumped in the summer of 1913, although the average daily pumpage during 1917 was only 8,156,000 gallons. This corresponds to an average daily consumption per capita of 85 gallons.

The quality of Peoria water has always been regarded as excellent. In fact, such reliance has been placed on it that no regular bacterial examinations are made either by the water company or the City Health Department. An examination, made Sept. 29, 1917, by the Illinois State Water Survey, revealed a gelatin count of five bacteria per cubic centimeter, an agar count of two bacteria per cubic centimeter and the following presumptive tests for colon bacilli: Four samples of 10 c.c. each, three negative and one positive; two samples of 1 c.c. each, both negative; two samples of 0.1 c.c. each, both negative. Examinations that have been made in connection with the course in bacteriology at the Bradley Polytechnic Institute indicate that the water has usually contained from ten to fifty bacteria per cubic centimeter, with no gas formers in 1 c.c. samples.

It is significant that during the summer of 1910 a diarrheal epidemic occurred in Peoria which was not, however, so extensive as the present one. Your correspondent is informed that bacterial counts of the city water made at that time gave very high results, including the presence of gas-forming organisms, and that the condition of the water returned to normal coincident with the subsiding of the epidemic. No thorough investigation of the water supply appears to have been made at that time.

As is well known, the weather conditions this winter have been extraordinary. The mean temperature during January of 10 at Peoria was the lowest for that month recorded in the history of the weather bureau, that is, since 1856, and February came in with 9 inches of a snowfall of 16.9 inches still left on the ground. The thaw started on the 6th of February, and the thermometer remained above freezing until the 13th. By this time most of the snow had disappeared and the river started to rise, reaching almost a flood stage on the 18th. This epidemic followed closely on the thaw with its resulting high water.

By a study of the epidemiologic characteristics, some of the possible sources of infection can well be excluded. The most pronounced features are the widespread distribution, the sudden onset and brief period covered. These factors could be involved only where the infecting agent was widely disseminated, appeared in large amount, and quite rapidly disappeared. On this basis any one food with the exception of milk can be at once excluded, since there is nothing which every one buys and uses in quantity at exactly the same time. In this instance the milk supply also can be eliminated for, as stated above, this comes from a large number of small dairies, and the possibility of their all being infected at one and the same time is remote.

Gastro-intestinal disturbances of this nature due to bacterial infection are not known to be transmitted through the air.

The water situation should therefore be studied with some care. Officials of the water company stated that as far as they knew nothing unusual had occurred in the operation of the water supply system during the past two weeks. Since, however, no regular examinations are being made, there seems to be no assurance of continuous purity of the water.

Some evidence has appeared as to the character of the water during the epidemic from the work of Prof. W. H. Packard, head of the department of biology of the Bradley Polytechnic Institute, who, on his own initative, examined samples of city water drawn from the tap at his house into sterile containers. The first sample was taken Thursday, February 21, and gave a count of 1,530 bacteria per cubic centimeter on agar at 37 C. after twenty-four hours. Lactose-fermenting organisms were obtained in two 1 c.c. and in two 5 c.c. samples. Professor Packard again made tests on samples of water collected Saturday, and this time obtained 142 bacteria for his count with no acid colonies; and no gas formers were found in 5 or 1 c.c. samples after twenty-four hours.

Your correspondent was informed that in the week of February 11, an engineer employed at the water company's pumping station had died after an operation. It seems fair to assume that this necessitated some change in employees at the pumping station.

The epidemiologic evidence, together with that obtained from Professor Packard showing an unusually large number of bacteria in the water coincident with the height of the epidemic, and a decrease in bacteria corresponding to a decline of the number of cases, points to the city water as the source of the infection. Sudden outbreaks of water-borne diseases coincident with temporary pollution of the water supply have often been recorded. An example of this was reported in 1912 from Rockford, Ill., where 10,000 cases of enteritis followed contamination of the water supply.[1]

Cases of intestinal disturbance similar to those in Peoria were reported during the epidemic, from surrounding towns. Five cases in Pekin, Ill., and four in Chillicothe, Ill., were followed up, and all were found to have connection with the city, most of the patients working in Peoria, and the others having been there for shopping or other purposes just prior to being taken ill. Two cases in Peoria were reported to have no connection with the use of water; but no rigid investigation was made to determine this point.

The water supply, therefore, appears to have been the responsible agent. The possibility of contamination of some wells now surrounded by Illinois River water, although not admitted to have been drawn on for supply, and the possibility of change in staff at the pumping station, add to the weight of evidence already mentioned. The actual method of this contamination can probably be best ascertained by an investigation by the officials of the water company, who have knowledge of the course of events preceding the epidemic.

1. Jour. Inf. Dis., 1912, **11**, 21-43.

New and Nonofficial Remedies

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION. W. A. PUCKNER, SECRETARY.

TYPHOID VACCINE (See N. N. R., 1917, p. 312).
Eli Lilly & Company, Indianapolis.

Typhoid Vaccine, Prophylactic.—Marketed in packages of one 5-Cc. and one 20-Cc. vial, each Cc. containing 500 million killed B. typhosus; also in packages of one 5-Cc. and one 20-Cc. vial, each Cc. containing 1,000 million killed B. typhosus; in packages of three 1-Cc. vials, one containing 500 million and two each containing 1,000 million killed B. typhosus; in packages of three 1-Cc. syringes, one containing 500 million and two each containing 1,000 million killed B. typhosus. Also marketed in hospital-size packages of ten complete immunizations in thirty 1-Cc. vials.

Typhoid Vaccine, Therapeutic.—Marketed in packages of two 1-Cc. vials, one 5-Cc. vial and one 1-Cc. syringe, each Cc. containing 100 million killed B. typhosus; in packages of two 1-Cc. vials, four 1-Cc. vials, one 5-Cc. vial, one 20-Cc. vial and one 1-Cc. syringe, each Cc. containing 250 million killed B. typhosus; in packages of two 1-Cc. vials, one 5-Cc. vial and one 1-Cc. syringe, each Cc. containing 500 million killed B. typhosus; in packages of two 1-Cc. vials, one 1-Cc. syringe, each containing 1,000 million killed typhosus; in packages of four 1-Cc. vials, containing respectively 100, 250, 500, and 1,000 million killed B. typhosus; and in packages of four 1-Cc. syringes, containing respectively 100, 250, 500, and 1,000 killed B. typhosus.

Typhoid Mixed Vaccine (*Typho-Bacterin Mixed*).—Marketed in packages of three 1-Cc. vials, one containing 250 million each killed alpha and beta B. paratyphosus and 500 million killed B. typhosus and two containing 500 million each killed alpha and beta B. paratyphosus and 1,000 million killed B. typhosus; in packages of three 1-Cc. syringes, one containing 250 million each killed alpha and beta B. paratyphosus and 500 million killed B. typhosus and two containing 500 million each killed alpha and beta B. paratyphosus and 1,000 million killed B. typhosus; in packages of one 5-Cc. vial, each Cc. containing 500 million each killed alpha and beta B. paratyphosus and 1,000 million killed B. typhosus; and in one 20-Cc. vial, each Cc. containing 500 million each killed alpha and beta B. paratyphosus and 1,000 million killed B. typhosus. Also marketed in hospital-size packages of ten complete immunizations in thirty 1-Cc. vials.

BULGARIAN BACILLUS TABLETS-MULFORD.—Tablets containing a practically pure culture of *Bacillus bulgaricus.*

Actions and Uses.—See the general article on Lactic Acid-Producing Organisms and Preparations (New and Nonofficial Remedies, 1917, p. 163).

Dosage.—For adults and children, 1 or 2 tablets after meals and at bed time. For infants, 1 or 2 tablets with each feeding. The tablets are marketed in vials of 50 tablets. An expiration date is stamped on the label.

Manufactured by the H. K. Mulford Co., Philadelphia. No U. S. patent or trademark.

A culture of Bacillus bulgaricus grown on whey is mixed with starch, sugar and milk sugar, dried and compressed into tablets.

Henley's View of Lister.—The sonnet of Henley the poet, who was Lister's first patient in the first weeks of his Edinburgh professorship, gave a picture of Lister that no other pen could attempt to equal. It was entitled "The Chief," the name by which Lister was fondly known.

"His brow spreads large and placid, and his eye
Is deep and bright with steady looks that still.
Soft lines of tranquil thought his face fulfill—
His face at once benign and proud and shy.
If envy scout, if ignorance deny
His faultless patience, his unyielding will,
Beautiful gentleness and splendid skill,
Innumerable gratitudes reply.
His wise, rare smile is sweet with certainties,
And seems in all his patients to compel
Such love and faith as failures cannot quell.
We hold him for another Heracles,
Battling with custom, prejudice, disease,
At once the son of Zeus with Death and Hell."

Wrench, G. T.: Lord Lister, His Life and Work.

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SATURDAY, MARCH 2, 1918

THE INHERITANCE OF ACQUIRED CHARACTERS

"When I reply to an inquirer that my own work is largely concerned with studies of heredity," an American biologist recently wrote, "I am likely to be met with the response: 'Oh, yes! — Mendel's law.' To the nonscientific reader this last expression commonly means little, except in so far as it is held to imply something thoroughly up to date. In the rather unintelligible jargon which reaches his ears from the noisy forum of 'genetics,' these are doubtless words which occur most frequently. He very naturally carries away the impression that heredity is mendelism, and mendelism, heredity." [1]

The mendelian theory of inheritance assumes that most, if not all, of the characters of an organism can be resolved into "units," which are as a rule inherited independently of one another. The characteristics of the parents may blend in the bodies of the offspring; but in the germ cells segregation of these characters invariably occurs so that they may become visible again in the next generation. Thus there is no true "blended inheritance." The unit factors of the germ plasma are regarded as not subject to the ordinary phenomena of variability shown by the visible body of the organism. Physical or chemical stimuli may act on the germ plasm and bring about changes which may become permanent in heredity; but the mendelian hypothesis does not admit changes in the germ plasm as the result of influences from the surrounding body of such a nature that the acquirement of the latter may be passed on to succeeding generations.

It will be noted from this hasty generalization that the mendelian theory has no place for the inheritance of acquired characters, that long controverted belief which agitated the physicians of a few decades ago. To the mendelian convert the inheritance of acquired characters is an impossibility. It violates the traditions of the "continuity of the germ plasm" for which Weismann was responsible. Sumner,[1] however, has directed attention to recent experiments by the American zoologist Guyer, which seem to give a better standing to some of the unaccepted manifestations of inheritance. Guyer demonstrated the production of specific antibodies in the blood of the domestic fowl, following the injection of an extract of the lens of the eye of *Peromyscus,* the ordinary field mouse. When blood serum from such a fowl was injected into the abdominal cavity of a pregnant female field mouse, the young were born either with partially liquefied or partially opaque lenses.

This is a remarkable phenomenon, and the progress of Guyer's investigations will be watched with great interest by all students of heredity. He has already extended them, with comparable results. If antibodies of the sort just described prove to be capable of affecting the germ cells in such specific ways, we shall have a mechanism, as Sumner expresses it, analogous to that by which the transmission of somatic modifications may be conceived to occur. Perhaps, then, the question of the inheritance of acquired characters is not entirely a dead issue, after all, even if it cannot be upheld in the precise formulation of the days when one freely discussed the distinction between congenital and acquired characters with which the physician was often expected to deal.

1. Sumner, F. B.: Modern Conceptions of Heredity and Genetic Studies at the Scripps Institution, Bull. Scripps Inst., 1917, No. 3.

THE CONTROL OF MENINGITIS IN ARMY CAMPS

Early in 1917, according to Thomsen and Wulff,[1] a number of cases of meningitis occurred in the Copenhagen district which differed from the classic type of epidemic meningitis in that the disease was severe, causing forty-one deaths out of forty-two patients. The exanthem was constant and pronounced. Twenty-six of the patients were soldiers or sailors, and direct connection with the military could be traced in all but eight of the civilian cases. All of the factors indicated a meningococcus sepsis rather than the ordinary cerebrospinal type of meningitis. The authors conclude that in the majority of cases meningitis must be regarded as a metastatic complication of a primary infection in the blood, that the meningococci vary in virulence at different periods, that the virulence is enhanced by repeated passage from one nasopharynx to another, and that the greatest number and severity of cases occur during the cold seasons when people are housed most closely and are subject to catarrhal affections, coughs and colds.

The views of these Danish investigators are especially interesting in the light of certain reports on meningitis recently published in this country relating to the occurrence of the disease among our soldiers and sailors. We refer particularly to the papers by

1. Thomsen, O., and Wulff, F.: Meningococcus Infection and Meningitis, Hospitalstidende, 1917, **60,** 1192; abstr., THE JOURNAL A. M. A., Feb. 16, 1918, p. 498.

Herrick[2] and Medlar[3] from two Army camps, and a discussion by Surgeon Mink[4] on meningitis as it occurred in the Great Lakes Naval Training Station near Chicago. In the epidemic described by Herrick in which 140 cases were observed, he found that the disease was not primarily a meningitis but a meningococcus sepsis, marked particularly by the exanthem and a severe general reaction. In the epidemic described by the Danish investigators, as well as in that described by Herrick, the spinal fluid was clear and limpid with a normal cell count. While it was inevitably found sterile in the cases reported from Copenhagen, thorough centrifugation and repeated examinations usually revealed meningococci in the Camp Jackson cases. Medlar's experience was similar to that of Herrick, and also confirms the work of the Danish investigators to the effect that an epidemic of sore throat was synchronous with an increase in the number of carriers of meningitis and with the number of meningitis cases. In the months of November and December, from 3 to 6 per cent. of carriers were found at Camp McClellan, and during the month of January, with the coming of more severe weather and an increase in the cases of "colds" and sore throat, the number of carriers rose from 12 to 20 per cent.

The results reported by the investigators mentioned are particularly interesting in connection with the suggestion of Surgeon Mink that to combat meningitis by the removal and segregation of all carriers is not practicable. Mink regards meningitis, as it occurs in Army and Navy camps and barracks, as essentially a disease of the young recruit, directly dependent on the transfer of the individual from a sheltered life to the exposed and strenuous life of the soldier or sailor. At the Great Lakes Naval Training Station, in which he made his observations, the first case of meningitis in the Second Regiment appeared four days following a regimental outbreak of coughs and "colds" in which practically the entire regiment was crippled by bronchitis, coryza or influenza. With the subsiding of this epidemic of coughs, the meningitis began to subside. During the epidemic of meningitis at the Great Lakes Naval Training Station, he relates, it was found that in some barracks which contained 8 or 9 per cent. of carriers, meningitis developed quite extensively, whereas in other barracks which contained 25 or 30 per cent. of carriers, no meningitis developed. In the instances in which a large percentage of carriers were found, the carriers were removed; in other instances the carriers were left in the barracks. New cases failed to develop in both instances. The final conclusions of Mink are, that meningitis in epidemic form among sailors is primarily dependent, not on the presence of carriers among them, but rather on (*a*) exposure to severe weather conditions (*b*) the spread of "colds," pharyngitis and influenza, and (*c*) crowding in barracks. The spread of the disease therefore is to be checked by prophylaxis against these factors rather than by the detection and segregation of carriers. He believes that an unusual amount of attention is given to meningitis because it is regarded as serious and dangerous, not because it affects a large number of men. Even in the most severe epidemics among recruits, a relatively small number develop the disease. "In an army of 25,000," he says, "to fight a disease that affects only a small proportion and kills or disables a still smaller proportion by segregating all carriers, is uneconomical and against military efficiency."

To summarize: it appears that meningitis, as it has occurred in the Army camps or Navy barracks mentioned, was conspicuously related to the spread of the common diseases of the respiratory tract which, in turn, is directly related to the crowding of men in barracks and exposure to the elements. At the same time it must be recognized that the incidence of the disease was to some extent dependent on the presence of carriers among the men. As a certain number of carriers appears always to be present, the contention of Surgeon Mink that epidemic meningitis should be controlled without relation to the presence of carriers is worthy of consideration. Is it possible that the military situation is such as to interfere with the control of meningitis by absolute and thorough control of carriers?

2. Herrick, W. W.: Epidemic of Meningitis at Camp Jackson, THE JOURNAL A. M. A., Jan. 26, 1918, p. 227.
3. Medlar, E. M.: Epidemic Cerebrospinal Meningitis at Camp McClellan, THE JOURNAL A. M. A., Feb. 16, 1918, p. 458.
4. Mink, O. J.: Points in the Epidemiology of Meningitis; abstr., THE JOURNAL A. M. A., Feb. 23, 1916, p. 463.

THE VASOMOTOR MECHANISM IN SHOCK

In the light of the rapidly accumulating data on the manifestations of shock, the diversity of experimental conditions in which shock can be produced, and the seemingly unrelated phenomena that have been observed in connection with shock, it would be little short of editorial rashness to venture even a tentative conclusion as to the real underlying etiologic factors. The problems of shock are at present being investigated by the Committee on Physiology of the National Research Council in this country, and by a special committee on shock and allied conditions, working in England. Some of the preliminary results have already been reported in THE JOURNAL.[1] Probably the more refined analysis of the conditions, so familiar to the surgeon, in which a patient develops alarming symptoms during or soon after an operation will ultimately necessitate a more discriminate use of the term

1. Henderson, Yandell; Prince, A. L., and Haggard, H. W.: Observations on Surgical Shock, THE JOURNAL A. M. A., Sept. 22, 1917, p. 965. Guthrie, C. C.: Experimental Shock, THE JOURNAL A. M. A., Oct. 27, 1917, p. 1394. Erlanger, Joseph; Gesell, Robert; Gasser, H. S., and Elliott, B. L.: An Experimental Study of Surgical Shock, ibid., Dec. 22, 1917, p. 2089.

"shock"; perhaps it will permit the reference of a few common manifestations, such as the low arterial blood pressure, to a diversity of causal agencies.

Meanwhile every effort must be made to preserve an "open mind" in the consideration of a topic of such profound importance as surgical or traumatic shock. However attractively any single and seemingly lucid interpretation may be presented, the clinician must be warned against the pitfalls of restricted vision and undue enthusiasm. Fat embolism cannot account for all of the cases; acidosis may as well be an accompaniment as the instigating agent in shock; the retention of the blood in the splanchnic area will not explain away the mysteries of many manifestations; perhaps we may still say that shock includes something of these features, and something more.

Warnings against the overready acceptance of any "theory" of shock are timely, because an urgent situation always predisposes the clinician to grasp at the most available resource to combat his difficulties; and so long as the uncritical mind is concentrating its interests and directing its efforts in a predetermined channel, it is liable to overlook any except the most immediate possibilities of relief that are presented. Thus far neither saline infusions nor epinephrin administration nor various other once indicated devices for combating some evident manifestation of shock have succeeded, by themselves, in bringing a permanent relief in the majority of the cases tested. The mechanism of the blood depletion that seems to occur in shock and the location of the displaced blood remain to be disclosed.

An illustration of the unwisdom of drawing final conclusions respecting the conditions attending shock has been afforded by the experimental studies of the staff of the Department of Physiology at the Washington University Medical School at St. Louis.[2] Earlier in the debate as to the causes of shock, much stress was placed on the probability of a fatigue of the vasomotor center, with a consequent failure of the circulation to respond in the normally effective manner when blood pressure for some reason was lowered. Subsequently it seemed to be demonstrated by Porter and others that the vasomotor center cannot be fatigued by excessive stimulation, and that accordingly a failure to maintain pressure is not attributable to this factor of the circulation complex. Such conclusions, to which we have repeatedly subscribed, tended to shift attention to peripheral factors in shock. The St. Louis physiologists are frank in the statement, however, that the tone of the vasomotor center falls below normal, very shortly after shock develops, as a result either of fatigue or of deficient blood supply to the center, both consequent, they believe, on the low blood pressure. They admit that failure of the vasomotor center is surely not the main cause of shock; but they contend that a center which holds the vessels merely to their normal caliber at a time when arterial pressure is subnormal is not in normal condition. A normal center, they add, would under such circumstances hold the arteries to less than their normal size. There is evidence also that in shock the respiratory center is sluggish, and is "working very close to the limit of viability."

Erlanger and his colleagues[2] venture the belief that laboratory shock is not very different from shock as seen in war surgery. Having issued a warning against the dangers of overhasty theorizing, we feel free to quote the latest hypothesis of these American investigators. They suggest that the causative factor of shock may be a reduced circulation — to which many of the phenomena point[3] — brought about possibly through the action of pain stimuli, and of a certain amount of hemorrhage, on the vasoconstrictor mechanism.

2. Erlanger, Gesell, Gasser and Elliott (Footnote 1).

INCREASED RANK AND AUTHORITY FOR MEDICAL OFFICERS

The time has come to make a final effort to impress on Congress the importance of an early and favorable consideration of the Owen and Dyer bills. It is not necessary to recapitulate the fundamental arguments that call for congressional approval of this legislation. However, we must here emphasize that the success of this measure is desired primarily in the interest of the sanitary and health conditions of the Army.

The sanitary service of troops is not an imposition or a necessary evil, as Colonel Ford[4] has pointed out in the introduction to his work on military hygiene and sanitation, but an effort to assist the commander in preserving the health, and thus the number and morale of his troops. It is an essential and integral part of the military organization. If the sanitary service is to operate to its full efficiency, its advice must be consulted and its orders must be obeyed. "Discipline is essential for the proper enforcement of orders affecting health," says Colonel Ford. "The sanitary adviser can do nothing if his recommendations are not enforced by the commanding officer. Under similar circumstances the morbidity of those commands whose discipline is lax, is invariably higher than is that of those whose discipline is strict. . . . In the last analysis, however, responsibility for the health of the command rests upon its commanding officer."

Although it is true that the health of the troops under the administration of our Army today is an indication of the judgment and experience of the commanding officer, the fact remains that if epidemics arise, if there occurs an increased morbidity and mortality among the troops, if anything even remotely

3. Mann, F. C.: Bull. Johns Hopkins Hosp., 1914, **25**, 205.
4. Ford, J. H., Colonel M. C., U. S. Army: Elements of Field Hygiene and Sanitation, Philadelphia, P. Blakiston's Son & Co., 1917.

affecting the good health of the troops receives publicity, the Medical Department is called to account. The public does not criticize the commanding general or the War Department as a whole; it is the Medical Department which receives the blame and which must appear before the bar of public opinion to justify its work and its ability. Every one knows that the primary purpose of the Army is military efficiency, and that important as are hygiene and sanitation, they must sometimes be ignored. As Ford says, "Military exigencies must dominate before an engagement, during it and perhaps after it." But when troops are in camp undergoing training over long periods of time, as are our troops at present, the medical and sanitary officer should not be in the position of a mere adviser of little rank whose recommendations may be considered by a line officer as the latter's judgment or disposition may indicate. The medical officer should be given rank sufficient to command the wholesome respect and consideration of line officers, and with this rank should be authority to enforce an important order without bias against his future Army life.

Current Comment

WAR EDEMA

A Norwegian medical journal[1] gives abstracts of certain articles in German medical weeklies,[2] in which is again described a disease concerning which very little is known outside of Germany. The German articles are said not to give any definite indications as to how extensive the disease has been, but there seems to have been no lack of material. The condition was observed first in prison camps; later it appeared in the civilian population, as a rule in the form of outbreaks like an epidemic. Heavy laborers, especially men over 40, were attacked mostly, presumably because most of the young men were away and lived under different conditions. As the name indicates, the outstanding feature is edema, which as a rule develops rapidly, often after exertion, and sometimes assumes very large proportions. The edema is said to involve principally the lower extremities, less often the upper, the face, and the serous cavities. Often there is pain in the affected extremities. This condition may last for months with remissions and intermissions unless permanent relief is secured by change of diet and rest. Rest in bed and change of diet so that at least 100 gm. of fat are eaten each day result in the prompt disappearance of the edema; there is then marked diuresis, and the patient may seem to dry up, becoming as thin as a skeleton, the muscles in the parts that were edematous having shrunken greatly. There is, of course, great weakness in connection with the edema. The urine is normal except for increase in acetone, ammonia, amino acids, uric acid and creatinin. The blood is watery and shows evidence of extensive breaking down of proteins. Provided change of diet in the direction indicated and rest can be obtained, the prognosis seems to be good. Apparently all the writers believe that the cause of this to us unfamiliar morbid picture must be sought in the diet; excess of carbohydrates and deficiency of fats, together with large amounts of water, as the food may be mostly in the form of soups, appear to be regarded as the most important factors. In an article,[3] published nearly two years ago, on "edema disease," Jürgens rejected the idea held at first that this edema was of infectious origin, and ascribed it exclusively to dietetic deficiencies. A similar war deficiency edema has been described by Landa[4] as having been prevalent in and around the City of Mexico in 1915. It lies near at hand to speculate as to what some of the essential ultimate factors may be (deficiency of fat-soluble vitamins?); but we have not enough detailed information to form reliable foundations for speculative superstructures.

SAVING DAYLIGHT

The suggestion that the clock be advanced one hour, or even two hours, during the summer months was made some time prior to the great war, but no action was taken in any country. This is not to be wondered at, as the chief beneficiaries of the plan would be the unorganized public. Since the war has put a premium on the efficiency of the masses and has also put a premium on oil and coal and the power derived from these products, most of the European nations have adopted the plan of advancing the clock one hour. A bill looking toward the same result was introduced at Washington last year, and was passed by the Senate in June. It still awaits action in the House; this, too, in spite of the vivid lesson we have had during the past few weeks on the need of conserving coal. The daylight saving plan has, from a health standpoint, everything in its favor and nothing against it.

LEGISLATION FOR COMMUTATION OF QUARTERS FOR COMMISSIONED OFFICERS IN THE FIELD

For some time an effort has been made to obtain for officers on field duty with troops the commutation for quarters, light and heat that is now given to officers stationed where public quarters are not available. A bill has been introduced into the House of Representatives and into the Senate to procure this commutation for officers with dependents while on duty with troops. The bill was referred to the Military Committee and promptly returned to the Senate with a favorable report consisting of an explanation by the Secretary of War of the necessity for immediate action. The bill provides that quarters and commutation thereof to all commissioned officers of the Army on duty in the field, or on actual duty outside the United States, who maintain a residence for wife,

1. Norsk Mag. f. Lægevidensk., 1918, **79**, 117.
2. Maase and Zondek: Berl. klin. Wchnschr., 1917, No. 36; Deutsch. med. Wchnschr., 1917, No. 16. Knack and Neumann: Ibid., 1917, No. 29.
3. Jürgens: Berl. klin. Wchnschr., 1916, **53**, No. 9; abstr., THE JOURNAL, April 15, 1916, p. 1278.
4. Landa: Gac. méd., Mexico, 1917, **11**, 67; abstr., THE JOURNAL A. M. A., Feb. 9, 1918, p. 424.

child or dependent parent, shall be furnished at the place where the residence is maintained, without regard to personal quarters furnished to the officers elsewhere. The number of rooms prescribed in the act of March 2, 1917, is to govern, and in case quarters are not available, every commissioned officer is to be paid commutation thereof at the rate authorized by law in cases in which public quarters are not available. The Secretary of War calls attention to the fact that officers serving with troops are actually undergoing privation incident to personal service, particularly abroad. The matter has been considered especially by the *Defense Bulletin*, published by the Army League of the United States, and by the *Infantry Journal*, which presents the following table:

Table showing the difference in average monthly pay (including commutation of quarters, heat, and light) of officers on duty at Washington and others of like grade on duty with troops at Camp Meade, a few miles distant.

Grade	Monthly Pay at Washington	Monthly Pay at Camp Meade	Monthly Premium for Privilege of Serving with Troops	Percentage of Reduction in Pay for Service with Troops
Second Lieutenant	$173.66	$141.67	$ 31.99	18
First Lieutenant	212.79	166.67	46.12	22
Captain	259.74	200.00	59.74	23
Major	323.27	250.00	73.27	23
Lieut.-Colonel	378.83	291.67	87.16	24
Colonel	444.14	333.33	110.81	25

This is a problem which affects every medical officer, and certainly justice demands that the bill receive favorable consideration.

PETITION CONGRESS

No arguments should be necessary to convince civilian physicians of the necessity for the success of some such legislation as that provided by the Owen and Dyer bills for increased rank and authority of medical officers. It should be remembered, however, that Congress, which usually is busy in time of peace, is even more pressed with work in time of war, and however anxious the individual congressman and senator may be to inform himself completely on each measure before casting a vote, the demands on his time are such that frequently this is impossible. There has arisen, therefore, the method of influencing Congress by a direct appeal from the citizens of the country to their representatives. In view of this fact, the American Medical Association last week sent to every county society in the country an appeal to take up this matter individually and collectively, and to petition the senators representing their state and the congressman representing their county to support this measure. An organized appeal of this character, backed by the request of the physicians of the country and supported in turn by the citizens with whom physicians may have influence, will cause Congress to give these appeals the special consideration which they merit.

Educate the Mothers.—Efforts directed toward the prevention of infant mortality show more apparent results than any other form of infant or child welfare work. In practically every instance in which a community has undertaken to save the lives of its babies it has been successful. The chief means has been the education of the mother. Wherever that has been successfully accomplished the infant death rate has fallen.—C. V. Chapin, M.D.

Medical Mobilization and the War

IMPORTANT CHANGES IN REGULATIONS ON PHYSICAL EXAMINATIONS FOR SELECTIVE SERVICE

The Provost Marshal, General Crowder, requests the publication of the following telegram received after part of this issue of THE JOURNAL had gone to press:

Upon recommendations of many governors the Surgeon-General of the Army amends the regulations governing physical examinations of registrants as follows:

Referring to CHANGES No. 3, of JANUARY 2, EIGHTH, SECTION 182, the following paragraph on page 1 shall be stricken out.

All other registrants must be referred by the Local Board to the Medical Advisory Board for further examination and classification."

In lieu thereof insert the following:

"Local Boards may accept registrants for special and limited military service but must refer all doubtful and remediable cases to the Medical Advisory Board."

Referring to page 3 of CHANGES, NUMBER 3, SECTION 184, strike out the first paragraph of said Section 184 beginning

"Remember that Local Boards"

And ending

"Recommendation of the Medical Advisory Board."

Insert in lieu thereof the following:

"Local Boards can accept or reject for general military service and may also accept for special or limited military service but must refer all doubtful or remediable cases not falling within said three classes to the Medical Advisory Board."

Referring to Manual of Instructions for Medical Advisory Boards, FORM 64, now being distributed, make the same changes in the first paragraph, top of page 9, and paragraph of Section 184 at middle of page 13.

Referring to new Section 128½, printed in Manual of Instructions for Medical Advisory Boards, beginning at page 3 thereof and ending on page 6 thereof, add to the end of said Section 128½ at page 6 of new manual the following paragraph:

"Local Boards may accept a registrant as physically qualified for special or limited military service in a named occupation or capacity without reference to the Medical Advisory Board."

Please communicate these changes to all local, district and Medical Advisory Boards with instructions they are effective immediately on receipt by boards and that if cases of registrants probably qualified for special or limited military service have already been referred to the Medical Advisory Board, the same may be recalled at the discretion of the Local Board unless already decided by the Medical Advisory Board, in which latter event the result of the examination shall stand unaffected.

Any and all provisions relating to physical examinations contained in selective service regulations or changes number three or manual of instructions for medical advisory boards, FORM 64, inconsistent with these amendments are hereby repealed.

Printed slips of the foregoing amendments will be distributed as soon as possible.

CROWDER, Provost Marshal.

New Assistant Surgeon-General in Public Health Service

Surg. A. J. McLaughlin has been detailed to Washington as Assistant Surgeon-General of the Public Health Service in charge of the Division of Domestic (Interstate) Quarantine, beginning March 1. He takes the position vacated by Asst. Surg.-Gen. W. C. Rucker, who has been assigned to duty abroad.

Wounded in Action

Lieut. Thomas M. Holmes, M. R. C., Delmar, N. Y., is reported to have been slightly wounded in action, February 2.

Base Hospital Mobilized

Base Hospital No. 11, Chicago, representing the St. Joseph's, St. Mary's and Augustana hospitals, has been ordered to active duty, and Lieut. Robert E. Flannery, M. R. C., has been directed to mobilize the enlisted personnel and to proceed to Camp Dodge, Des Moines, Iowa, and to report to the commanding general of that camp for duty.

Hospitals for the Wounded Returned from France

The Army medical authorities, basing their opinion on figures from Canada and England, believe it will be necessary to provide hospitals in the United States with from 5 to 10 per cent. bed capacity for the troops serving abroad. A clearing hospital of 1,500 beds on Staten Island has been authorized and is now in process of construction. It is planned also to establish special hospitals, general hospitals and convalescent hospitals and camps. The following special hospitals have been proposed: the clearing hospital on Staten Island, three or four tuberculosis hospitals—one at Otisville, N. Y., is now under construction, the regular Army tuberculosis hospital at Fort Bayard, N. M., is being enlarged and ground has been leased at Asheville, N. C., for the erection of a tuberculosis hospital. A site has been selected for a hospital in Colorado, and the leasing of a tuberculosis hospital in Connecticut is under consideration. The hospital at Hot Springs, Ark., is being enlarged and hospitals in Baltimore will be used for blind and deaf patients. A hospital is being erected at Fort Porter, N. Y., for mental cases. A war neurosis and an epileptic hospital will also probably be necessary. The authorities are considering three methods to provide these hospitals: construction, leasing buildings and converting Army posts.

Rehabilitating the Soldier After the War

In Canada, under an order-in-council, power has been given to the Military Hospitals Commission to train for new occupations returned soldiers who have been disabled in such a way that they cannot engage in their former occupations. *Reconstruction*, a bulletin published by the Military Hospitals Commission for the information of all interested in the welfare of Canada's returned soldiers, in the January number sets forth the plan under which the soldiers are handled and describes trade and other schools and factories already at work reeducating the maimed soldiers to become self-supporting. Under the procedure established a standing order exists that every returned soldier must be interviewed by the vocational officer of the M. H. C. C. unit to which he is attached and a complete survey made of his capabilities from the industrial standpoint. If the soldier needs assistance he is interviewed by a vocational counsellor and a medical officer whose duty it is to consider the line of industry for which his aptitudes, previous training and remaining abilities qualify him. Their report goes to the Disabled Soldiers' Training Board, the members of which are acquainted with local industrial conditions, and after an interview with the soldier they select the course of training. Soldiers undergoing training receive a pay check from the government for the support of themselves and their families. In November, 1917, the number of men attending the vocational training classes was 3,356, 1,201 of whom were so disabled that they could not follow their former occupations. It has been found that about 10 per cent. of men passing through the Canadian convalescent hospitals require reeducation. In addition to this class is the class of convalescents who are given occupational treatment to loosen up their muscles and keep their minds occupied, as well as giving them an opportunity to improve their educational qualifications and their earning capacity. In this class no effort is made to teach new occupations. In preparing the disabled for new occupations everything is utilized from agriculture to handloom operation. For occupational purposes, commercial subjects and general education, carpentry, metal working, gardening and automobile mechanics are standard subjects. Tuberculous patients and those confined to bed, fancy work and embroidery, basketry and weaving provide occupation. For the limited number permanently incapacitated from active exertion some of the art hand crafts such as basket making, clay modeling and handloom operation have been employed with success.

NEWS OF THE CANTONMENTS

Thirty-Third Division, Camp Logan, Houston, Texas

FEB. 16, 1918.

LABORATORY SERVICE

The laboratory staff is at present working according to the following schedule, and the work divided as far as practicable in the way indicated.

Chief, First Lieut. Murray C. Stone, M. R. C., instructor—pathology.

Bacteriology, First Lieut. John C. Simpson, M. R. C. Spinal fluids, blood cultures, throat cultures, exudates, pneumococcus types, typhoid release, vaccines, Wassermanns.

Clinical Pathology, First Lieut. Louis D. Minsk, M. R. C. Urine, feces, stomach contents, blood counts, malaria, sputum, gonococcus, spirochaeta.

Public Health, First Lieut. Edwin Schultz, M. R. C. Water and milk supplies, typhoid carriers, meningococcus carriers, diphtheria carriers, Schick test, parasites.

On account of the freedom of the camp from epidemic disease of any serious magnitude, the work of the laboratory up to the present time has been largely routine in character; that is, such as would obtain in a large civil hospital.

The public health work so far has included the routine examination of water and milk supplies, and a comparatively limited number of examinations for carriers of various kinds.

The laboratory occupies at present 480 square feet of floor space, which in the near future will be more than doubled. An incubation room has been built which will allow of the incubation at one time of several thousand cultures. The officers in the laboratory are thoroughly acquainted with the various methods now employed in the detection of carriers, and in pneumococcus type differentiation, and with the administration of sera, so that in the face of a serious epidemic the entire force would at once be available for the necessary laboratory work.

PNEUMONIA

As it has been impossible to obtain white mice, the determination of pneumococcus types has been according to the method described in THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, Jan. 5, 1918, by O. T. Avery, M.D., of the Rockefeller Institute, New York. Those cases that give an organism, which forms a precipitate in Type 1 serum, are treated intravenously by doses of about 90 c.c. of Type 1 antipneumococcic serum to which an equal amount of normal saline solution has been added and the fluid allowed to run slowly into a vein at the elbow so that it takes about one-half hour for the total amount to be administered. In our cases we have noticed a slight rise of temperature during the first three or four hours after treatment, and then usually a sudden drop to normal with a coincident clearing up of symptoms. Those cases whose temperatures are still above 102 F. at the end of twelve hours, are treated again and repeated in twenty-four hours if the temperature still remains above 102. As this amount of foreign serum at times produces symptoms of anaphylactic shock all patients are desensitized two or three hours before the treatment by the hypodermic administration of 0.5 c.c. of the serum. By us this is done to each patient, while the sputum is being worked up, and when we find a Type 1 infection, the patient is already desensitized.

Eighty-Fourth Division, Camp Zachary Taylor, Louisville, Ky.

FEB. 18, 1918.

SCARLET FEVER AND MUMPS

The most rigid quarantine enforced yet at Camp Zachary Taylor was placed on the Forty-Sixth Infantry, Regular Army, February 12. The order placed a quarantine around the entire regiment for more than seven days, and included all officers and enlisted men. No one but those carrying supplies were allowed to enter or leave the camp. The quarantine was the result of the breaking out of seven cases of scarlet fever in seven companies, and the discovery of at least twenty-five suspected cases.

Scarlet fever has also been discovered in the Three Hundred and Twenty-Sixth Field Artillery. Experts of the medical department were sent to certain milk dealers to investigate their milk supplies in an effort to find the source of the disease.

Mumps is affecting nearly 300 soldiers, the "mump colony" being located in the One Hundred and Fifty-Ninth Depot Brigade, where two barracks buildings are fitted up. As the cases develop, the men are sent there instead of to the base hospital.

Measles has abated materially, there being but few new cases. One hundred and twenty-eight pneumonia patients were under treatment at the base hospital on the 13th, but only a few were serious.

The first death of a colored soldier occurred on the 13th from cerebrospinal meningitis.

EAR TROUBLES

Otitis media has made its appearance in an acute form at the camp, and a half dozen medical officers and several Red Cross nurses have suffered with it. First Lieut. L. A. Mayer, Capt. Milton J. Lichty and First Lieuts. Hugh L. McLean, Earl Moorman and Carl Harris have been affected. The otological department of the hospital was very busy during the past week.

SANITARY TRAIN DOWNCAST

Gloom struck the sanitary train last week when an order came through stating that unless specially ordered, the sanitary trains of a division will not move with the full organization. The order is believed to mean that Lieut.-Col. John H. Allen, commanding officer of the Three Hundred and Ninth Sanitary Train, and many other officers of the sanitary train will remain in Louisville.

CAPTAIN LICHTY'S DEATH

Gloom has prevailed at the base hospital over the death of Capt. Milton J. Lichty, M. R. C., of Cleveland, the first officer to die at the camp. He was universally liked, and his sudden taking created a deep impression. As chairman of the tuberculosis examining board he did faithful, efficient and painstaking work. He was at work early and late. The night before his death he dictated ten official letters, although in the officers' ward with otitis media. Like so many others in the camp, he had been infected with the *Streptococcus hemolyticus* and had had a severe cough and was much below par. The pneumococcic meningitis was very virulent, as he died twenty hours after the onset of the first general symptoms. His brother, Dr. J. A. Lichty of Pittsburgh, and his wife arrived after his death. All flags were at half mast in the camp, and a military escort left on the 15th for Cleveland with his remains, where he was buried.

BASE HOSPITAL ENLARGMENT

Considerable correspondence has passed between the military authorities at the cantonment and the War Department in regard to the needs of the base hospital, and there will be an increase of 700 beds with additional buildings for medical officers and enlisted men. The nurses' building has been finished. Lieut.-Col. Will Pyles has been notified that the nurses' quota will be increased from sixty-five, the original number, to 135.

PERSONAL

First Lieut. John B. Webster has been appointed orthopedic surgeon at the base hospital.——Chaplain John A. Ellis has been relieved from duty with the Three Hundred and Thirty-Sixth Infantry and assigned to the base hospital.——Capt. Marvin S. Veal of the base hospital has been ordered to proceed to his home, and on arrival there to revert to inactive duty status.——Major Julius McHenry, in charge of the surgical department at the base hospital, has returned to camp after a two months' course of instruction at the Roosevelt Hospital, New York, and resumed his official duties.——First Lieuts. Augustus B. Riley and George Hyenowine of the Three Hundred and Thirty-Sixth Infantry have been detailed students at the School of Hygiene and Sanitation.

FEB. 25, 1918.

Seventy-eight patients were received at the base hospital February 21, during the forenoon, the largest number for any half day on record. Most of the men were suffering from tonsillitis, grippe and coughs from laryngitis and bronchitis. No deaths were recorded during that twenty-four hour period.

COURT MARTIAL MEDICAL OFFICERS

Acting on the complaint of Representative Robert Y. Thomas, the War Department has issued instructions convening a court martial to try Lieut.-Col. John H. Allen, M. C., and Major Milton Board, M. R. C., Camp Zachary Taylor. The court martial is the result of allegations regarding the death of Otho Murray of Cumberland County, Ky., a selective draft man at Camp Zachary Taylor, who following measles, had acute ascending paralysis. He was allowed to be taken from the hospital and sent home, dying at Glasgow, Ky., before he reached his home.

PERSONALS

Lieut.-Col. John H. Allen has received an order from Washington, relieving him from duties as division surgeon and naming him as camp surgeon. Major Luther Poust, who has been chief sanitary officer has been detailed as acting division surgeon.——Lieut.-Col. Wallace De Witt, division surgeon of the Eighty-Third Division at Camp Sherman, spent a few days at Camp Zachary Taylor, conferring with Col. J. H. Allen and Major Luther R. Poust, regarding health conditions.——Colonel Donaldson and Major Sweet of the inspector general's office spent several days at Camp Zachary Taylor inspecting every department of the cantonment.——Major-Gen. Harry C. Hale, his chief of staff, Lieut.-Col. Lawrence Halstead and his aide Capt. Oscar Griswold, who have been to France returned to Louisville last week.——Capt. Bert E. Scott has arrived and reported to the Base Hospital.——Lieut. Lawrence H. Mayers has been ordered to Chicago to join Base Hospital Unit No. 14, as adjutant. Lieutenant Mayers has been assistant chief to the medical service at Camp Taylor since last October.

Eighty-Eighth Division, Camp Dodge, Des Moines, Iowa

FEB. 18, 1918.

BASE HOSPITAL NOTES

Our first hospital unit of 500 beds proved to be insufficient to care for the sick of this cantonment. In the latter part of December, therefore, the venereal patients and some of the patients with contagious diseases were moved into two large and two small barracks. These barracks have since been remodeled to meet most requirements. At present there is under construction another 500 bed unit, which will be ready for occupancy in about three weeks. The base hospital has received almost all of the sick of this command, which caused for a short time a little crowding in the general medical wards. On completion of the new hospital unit, we shall have accommodations for the sick of a division of 42,000 men.

The total number admitted to hospital to date has been 7,214 cases, with an average of 10.5 hospital cases to date. The average number of patients per day for November was 427, for December, 700, and for January, 975. Since the beginning of the camp, there have been forty-four deaths, or an annual death rate of 603 per hundred thousand.

The commanding officer of the hospital is Major A. T. Cooper, M. C., U. S. Army. The chief of the medical service is Major Joseph Miller, M. R. C. The chief of the section of surgery of the head is Major Frank Todd, M. R. C. The surgical service is temporarily in charge of Capt. C. G. Fraining. The laboratory is under the direction of Capt. Daniel Glomset and the roentgen-ray department under that of Capt. William G. Alexander, M. R. C.

The medical service has averaged 300 beds for general cases and about 600 beds for contagious cases. Arthritics and patients with bronchopulmonary diseases have formed the great bulk of the general medical cases, there having been but few gastro-intestinal cases, and no patients with a dystrophic or metabolic disease. During December and January, 100 soldiers with pulmonary tuberculosis were recommended for discharge, or one out of four of those given a special four to six day examination.

From the beginning of the cantonment to Feb. 1, 1918, this department has cared for the following number of cases of the communicable diseases: pneumonia, 168 (mortality, 15 per cent.); meningococcus meningitis, 14 (mortality, 36 per cent.); diphtheria, 30 (1 death); and the following cases without mortality: typhoid, 2; smallpox, 16; chickenpox, 6; measles, 595; scarlet fever, 65, and mumps, 850.

The laboratory has made 20,250 examinations, of which 1,205 were Wassermann reactions, 30 milk examinations, 955 cultures for typhoid, 2,543 cultures for the meningococcus, 621 examinations for intestinal parasites, 53 determinations of pneumococcus types, and 3,905 cultures for diphtheria bacilli.

The roentgen-ray department has made 2,800 examinations, of which 510 were for tuberculosis. Pneumonia patients have been roentgenographed as routine at five day periods until convalescent.

DISEASE CONDITIONS AMONG TROOPS IN THE UNITED STATES

Extracts from Telegraphic Reports Received in the Office of the Surgeon-General for the Week Ending Feb. 15, 1918

1. ANNUAL ADMISSION RATE PER 1,000 (disease only):

All Troops	1611.6
National Guard Camps	1424.9
National Army Camps	1901.8
Regular Army	1351.5

2. NONEFFECTIVE RATE PER 1,000 ON DAY OF REPORT:

All Troops	51.1
National Guard Camps	48.1
National Army Camps	59.4
Regular Army	41.8

3. CAMPS HAVING ADMISSION RATE FOR DISEASE HIGHER THAN AVERAGE: NATIONAL GUARD: Camps Bowie, Sevier, Wheeler, Doniphan, Kearny and Shelby. NATIONAL ARMY: Camps Travis, Pike, Funston, Sherman, Jackson, Zachary Taylor and Dodge. REGULAR ARMY: Central Department.

4. CAMPS HAVING NONEFFECTIVE RATE HIGHER THAN AVERAGE: NATIONAL GUARD: Camps Bowie, Sevier, Beauregard, Wheeler, Shelby, Kearny and Doniphan. NATIONAL ARMY: Camps Funston (Eighty-Ninth), Pike, Travis, Funston (Ninety-Second), Jackson, Zachary Taylor, Dodge, Sherman and Lee. REGULAR ARMY: Southeastern and Central Departments.

5. VENEREAL DISEASES: Annual admission rate per 1,000:

National Guard Camps	67.4
National Army Camps	69.8
Regular Army	69.2

CAMPS HAVING RATE ABOVE AVERAGE: NATIONAL GUARD: Camps Logan, Bowie, Beauregard, Wheeler and Sheridan. NATIONAL ARMY: Camps Pike, Zachary Taylor and Lee. REGULAR ARMY: Southern and Eastern Departments.

6. NUMBER OF NEW CASES OF PNEUMONIA REPORTED. 687
Highest number in any one camp (Travis) 76

7. NEW CASES OF SPECIAL DISEASES REPORTED DURING THE WEEK ENDING FEB. 15, 1918

Camps	Pneumonia	Dysentery	Malaria	Venereal	Paratyphoid	Typhoid	Measles	Meningitis	Scarlet fever	Deaths	Noneffective per 1000
Wadsworth	10	...	...	16	..	..	3	2	..	1	28.4
Hancock	6	...	...	18	..	..	9	4	2	5	28.2
McClellan	9	...	...	19	..	..	21	..	3	1	37.7
Sevier	23	...	...	20	..	..	33	2	17	3	67.7
Wheeler	10	1	...	35	..	..	4	1	..	4	61.9
Logan	23	...	...	117	..	..	39	1	..	3	34.9
Cody	38	...	...	12	..	..	9	3	..	8	43.2
Doniphan	26	...	1	19	..	..	5	..	..	10	49.6
Bowie	48	...	...	85	..	..	2	1	..	6	77.8
Sheridan	3	...	...	4	..	..	7	1	3	2	24.6
Shelby	5	...	...	25	..	..	3	1	1	6	60.9
Beauregard	18	...	...	50	..	..	...	5	..	6	65.9
Kearny	6	...	...	6	..	..	3	1	10	2	55.3
Devens	10	...	...	17	..	..	14	..	2	3	39.1
Upton	7	...	...	21	..	..	3	..	1	3	29.6
Dix	1	...	...	6	..	..	51	1	10	0	46.5
Meade	2	...	...	35	..	..	10	1	5	5	31.7
Lee	24	...	...	50	..	..	46	3	2	6	64.9
Jackson	5	...	...	4	..	..	15	4	..	3	75.8
Gordon	9	...	...	15	..	..	25	4	..	5	37.1
Sherman	4	...	...	22	..	..	41	..	16	5	66.3
Taylor	19	...	...	47	..	..	2	2	17	8	73.0
Custer	2	...	...	11	..	..	15	..	4	5	43.7
Grant	5	...	...	17	..	..	26	1	29	5	41.8
Pike	38	1	1	201	..	..	17	..	5	12	102.8
Dodge	17	...	...	25	..	..	23	3	15	2	68.8
Funston (89th)	3	...	...	16	..	..	8	2	3	4	107.1
Travis	76	2	...	29	..	..	1	2	..	10	101.6
Lewis	7	...	...	37	..	..	24	..	29	0	51.2
Funston (92d)	2	...	...	2	..	..	...	..	..	1	85.5
Regulars	216	3	4	510	..	..	545	27	84	95	41.8
National Guard in Departments	4	...	...	12	..	..	37	1	..	1	32.9
National Army in Departments	11	...	3	40	..	..	53	..	13	2	105.0

8. ANNUAL RATE PER 1,000 FOR SPECIAL DISEASES

	Regulars, U. S. Army, in U. S. only, 1916*	Regulars in U. S., Week Ending Feb. 15, 1918	National Guard, All Camps, Week Ending Feb. 15, 1918	National Army, All Camps, Week Ending Feb. 15, 1918
Pneumonia	2.50	29.3	34.8	29.5
Dysentery	39.7	0.4	0.1	3.8
Malaria	12.52	0.5	0.1	0.1
Venereal	91.23	69.2	67.4	69.8
Paratyphoid	0.31	0.0	0.0	0.0
Typhoid	0.21	0.0	0.0	0.0
Measles	20.28	73.9	19.8	40.9
Meningitis	0.29	3.6	3.2	2.9
Scarlet fever	0.59	11.4	5.6	17.6

* Enlisted men only, both white and colored.

PROMOTIONS

Captains of the Medical Reserve Corps Recommended for Promotion as Majors

Feb. 20, 1918

EDWARD CLARENCE MOORE, Los Angeles; GEORGE WATERS, Memphis, Mich.

First Lieutenants of the Medical Reserve Corps Recommended for Promotion as Captains

Feb. 20, 1918

JOHN FRYE CHAPMAN, San Francisco; ROBERT WELLINGTON CLANCY, Midford, Ore.; GARRETT MARCELLUS CLOWE, Schenectady, N. Y.; DOWELL GANN, Jr., Little Rock, Ark.; FLEETWOOD GRUVER, Nashville, Tenn.; CHARLES WILBUR HYDE, Washington, D. C.; CYRUS JACOBSKY, Wilkes-Barre, Pa.; JOHN GREENWOOD JENNINGS, Boston; ROBERT MAXWELL JONES, Culver City, Calif.; THOMAS HENSHAW KELLY, Cincinnati; JOSEPH JAMES KOCYAN, Plains, Pa.; GEORGE VICTOR LITCHFIELD, Abingdon, Va.; THOMAS LITTLEWOOD, Pittsfield, Mass.; AUSLEY LYMAN LOWE, Robinson, Ill.; VELPEAU HILL RAGSDALE, Bessemer, Ala.; FRED RANKIN, Baltimore; ABRAM KARL REEVES, East Orange, N. J.

Personnel of the Medical Department

For the week ending February 23, the personnel of the Medical Department of the Army included:

MEDICAL CORPS: 768, including 1 major general, 61 colonels, 103 lieutenant colonels, 210 majors, 2 captains and 391 lieutenants.

MEDICAL RESERVE CORPS: 17,052, including 1,011 majors, 3,762 captains and 12,279 lieutenants. On active duty: 13,687, including 844 majors, 3,227 captains and 9,616 lieutenants.

MEDICAL CORPS, NATIONAL GUARD: 1,207, including 7 lieutenant colonels, 259 majors, 147 captains and 794 lieutenants.

MEDICAL CORPS, NATIONAL ARMY: 32, including 4 brigadier-generals, 10 colonels, 16 lieutenant colonels and 2 majors.

The DENTAL CORPS, 211; DENTAL RESERVE CORPS, 5,036, of whom 1,297 are on active duty; DENTAL CORPS, NATIONAL GUARD, 266; VETERINARY CORPS, 24; VETERINARY RESERVE CORPS, 1,380, of whom 701 are on active duty; VETERINARY CORPS, NATIONAL GUARD, 57; VETERINARY CORPS, NATIONAL ARMY, 288; SANITARY CORPS, 864, and AMBULANCE SERVICE, 136, constitute the remainder of the commissioned personnel.

ORDERS TO OFFICERS OF THE MEDICAL CORPS

To Camp Wheeler, Macon, Ga., for duty in connection with the Medical Department of the Army, and on completion *to his proper station,* Major-Gen. WILLIAM C. GORGAS.

The following officers are constituted a board for the purpose of reviewing promotions in the Medical Corps of the National Army to the grade of colonel and lieutenant colonel: Brig.-Gen. CHARLES RICHARD, Col. REUBEN B. MILLER and Lieut.-Col. VICTOR C. VAUGHAN.

To Camp Greene, Charlotte, N. C.; *Camp Wadsworth,* Spartanburg, S. C.; *Camp Sevier,* Greenville, S. C.; *Camp Gordon,* Atlanta, Ga.; *Camp Jackson,* Columbia, S. C., to make special sanitary inspections, and on completion *to his proper station,* Col. PERCY M. ASHBURN.

To Fort Riley for duty as commanding officer, from Williamsbridge, N. Y., Col. EDWARD R. SCHREINER; from Fort Thomas, Major JAMES A. WILSON. For duty, from Camp Jackson, Major THOMAS J. LEARY.

To Hoboken, N. J., and *Camp Merritt, N. J.,* to make sanitary inspections, and on completion *to his proper station,* Col. DEANE C. HOWARD.

To Lake Charles, La., Gerstner Field, to make sanitary inspection, and on completion *to his proper station,* from Fort Sam Houston, Col. WILLIAM F. LEWIS.

To report to the commanding general, Western Department, for assignment to duty, Col. BENJAMIN J. EDGER, Jr.

To Williamsbridge, N. Y., for duty as commanding officer, from Fort Riley, Col. DOUGLAS P. DUVAL.

To Camp Wheeler, Macon, Ga., for duty in connection with the Medical Department of the Army, and on completion *to his proper station,* Lieut.-Col. CHARLES L. FURBUSH.

To Fort Oglethorpe, Camp Greenleaf, as commanding officer, from Hoboken, Lieut. Col. CRAIG R. SNYDER; from Douglas, Arizona, Major GEO. H. McLELLAN.

To New York City for duty, and on completion *to his proper station,* Lieut.-Col. LLEWELLYN P. WILLIAMSON. For duty, from St. Louis, Lieut.-Col. MARLBOROUGH C. WYETH. For instruction in orthopedic surgery, from Rochester, New York, Lieut. EGBERT H WESSON.

To Saranac Inn, Upper Saranac Lake, New York, to make inspection of property and on completion *to return to his proper station,* from Fort Ontario, Lieut.-Col. HENRY D. THOMASON.

To Camp Stuart, Newport News, Va., as division surgeon, from Camp Stuart, Major JULIUS F. LYNCH.

To Fort Leavenworth, Kan., for permanent duty, from Fort Leavenworth, Major FRANK N. CHILTON.

To Newport News, Va., for duty, from Camp McClellan, Major JAMES S. FOX.

To Portland, Ore., Spruce Production Division, for duty, from San Antonio, Major JOHN W. SHERWOOD.

To San Antonio, Texas, Kelly Field, for duty, from Boston, Mass., Major LOUIS H. BAUER.

To Waynesville, N. C., Asheville, N. C., and *Tallapoosa, Ga.,* to inspect property and on completion *to his proper station,* Major EARL H. BRUNS.

To Camp Beauregard, Alexandria, La., for temporary duty, from Camp Lee, Lieut. HENRY K. B. BUFFORD.

To Camp Custer, Battle Creek, Mich., for physical examination to determine his fitnes for active service, Lieut. GEORGE W. KRAHN.

To Camp Devens, Ayer, Mass., for duty, from Rochester, N. Y., Lieut. ALBERT BOWEN.

To Camp Grant, Rockford, Ill., for temporary duty, from Milwaukee, Lieut. NOBEL DuB. McCORMACK.

To Camp Greene, Charlotte, N. C., for duty, from Camp Logan, Lieuts. JOHN J. CARDEN, HAROLD H. GOLDING and FRANK McA. MOOSE.

To Fort McPherson, Ga., for duty, from New York Orthopedic Hospital, Lieut. JOSEPH R. JONES.

The following officers of the Medical Reserve Corps who have passed the preliminary examination for appointment in the Medical Corps of the National Guard will proceed to the Army Medical School for the required course of instruction: From Camp Meade, Lieut. HARRY A. BISHOP; from Camp Laurel, Lieut. LAWRENCE L. BLACKBURN; from Accotink, Va., Lieut. JAMES A. BUCHANAN; from Fort Thomas, Lieut. TATE B. COLLINS; from Camp Lewis, Lieut. ROY M. COX; from Camp Dix, Lieut. HUGH J. DAVIS; from Presidio of San Francisco, Lieut. DAVID A. GREGORY; from Camp Stanley, Lieut. JOSEPH KOPECKY; from Fort McHenry, Lieut. ABRAHAM L. OLSHANSKY; from Camp Sherman, Lieut. ALEXANDER F. ROBERTSON, JR.; from Camp Stanley, Lieut. HAROLD A. SPILMAN.

ORDERS TO OFFICERS OF THE MEDICAL RESERVE CORPS

Alabama

To Camp Beauregard, Alexandria, La., for duty, Lieut. EUGENE THOMAS, Mobile.

To Camp McClellan for temporary duty, Major JAMES N. BAKER, Montgomery; Lieut. ALVIN E. COWAN, Ensley.

To Fort Oglethorpe for instruction, Lieut. BENJAMIN J. LEWIS, Samson.

To Lake Charles, Gerstner Field, Signal Corps, Aviation School, for duty, Lieuts. MARION T. DAVIDSON, Ensley; TOLL H. SUDDUTH, Garden City.

To New York City Neurological Institute, for instruction, Major WESTLEY E. DRENNEN, Birmingham. *Cornell Medical College* for instruction and on completion *to Hoboken* for temporary duty, from Camp Dodge, Capt. ROBERT D. BROWN, Mobile.

To the inactive list, from duty as medical aid to the governor of Alabama, Major JAMES N. BAKER, Montgomery.

To their home and honorably discharged, Lieut. FRANK N. McCONNICO, Montgomery. On account of physical disability existing prior to entrance into the service, Lieut. SOSEA F. DOWNS, Clanton.

California

To Camp Kearny for duty, Lieut. SAMUEL McC. SPROAT, Portola.

To Fort Mason for duty, from New York City, Major ALANSON WEEKS, San Francisco.

To Los Angeles for instruction in orthopedic surgery, from San Francisco, Capt. EARL N. GREENWOOD, San Francisco. For instruction, Lieut. WALTER C. S. KEOBIG, Los Angeles. For orthopedic instruction, Lieuts. ARNOLD M. SCHOLZ, CHARLES S. YOUNG, Los Angeles; STUART Z. PEOPLES, Petaluma; JOSEPH W. CRAWFORD, Sacramento; LOUIS M. COY, San Bernardino; from Camp Kearny, Lieut. GABRIEL J. J. WISCHI, San Francisco; from Camp Lewis, Lieut. JOHN E. PAULSON, San Quentin. To organize a course of instruction and act as instructor in orthopedic surgery, JOHN C. WILSON, Los Angeles.

To report to the Commanding General, Western Department, for assignment to duty, Lieut. JAMES B. OWEN, San Francisco.

To Rochester, Minn., Mayo Clinic, for instruction and on completion *to Camp Sheridan,* Montgomery, Ala., for temporary duty, Capt. WILLIAM H. WICKETT, Fullerton.

To San Antonio, Texas, Kelly Field for duty, from San Antonio, Major FREDERICK P. GAY, Berkeley.

To his home and honorably discharged on account of his inaptitude for the service, Capt. LEWIS H. YOUNG, San Francisco.

Colorado

To Camp Logan, Houston, Texas., for temporary duty, Capt. OLIVER LYONS, Denver.

To Camp Joseph E. Johnston, Jacksonville, Fla., for duty, from Camp Joseph E. Johnston, Capt. PHILIP A. LOOMIS, Colorado Springs.

To Fort Riley for instruction, Lieut. HENRY H. PANTON, Denver.

Connecticut

To Camp Shelby, Hattiesburg, Miss., as Divisional Tuberculosis Specialist from Camp Upton, Lieut. RAYMOND V. QUINLAN, Meriden.

To Camp Stuart, Newport News, Va., for duty, from Fort Oglethorpe, Capt. JOHN S. BLACKMAR, Norwich.

To Fort Oglethorpe for instruction, Lieut. CHARLES J. GREENSTEIN, Meriden.

District of Columbia

To Danville, N. Y., for duty, Capt. CHARLES S. ROBBINS, Washington.

To Fort Oglethorpe as instructor in lung diseases, from Walter Reed General Hospital, Major ROY D. ADAMS, Washington; for instruction, Lieut. VIRGIL B. WILLIAMS, Washington.

Florida

To Camp Hancock, Augusta, Ga., Aviation Section Signal Corps, for duty, Lieut. ALBERT C. McKENZIE, Jacksonville.

To Fort Oglethorpe for instruction from Camp Jackson, Capt. JOHN MACDIARMID, DeLand.

To Washington, D. C., Government Hospital for the Insane, for duty, Capt. GEORGE D. COON, Tampa.

To their homes and honorably discharged, Capt. MALCOLM GUNN, Tarpon Springs; Lieut. LOUIS B. BOUCHELL, New Smyrna.

Georgia

To Camp Gordon, for duty, Lieut. WALTER R. McCOY, Danielsville.

To Camp Jackson, Columbia, S. C., for temporary duty, Lieut. GEORGE H. LANG, Savannah.

To Camp Joseph E. Johnston, Jacksonville, Fla., for duty, Lieut. LEE ROY HUTCHINSON, Adel.

To Fort Oglethorpe for instruction, Lieut. ROBERT C. MADDOC, Rome.

To Washington, D. C., Government Hospital for the insane, for intensive training, from Fort Oglethorpe, Lieut. JAMES K. PETTIT, Milledgeville.

Idaho

To Camp Sherman, Chillicothe, Ohio, for temporary duty, from St. Louis, Capt. ERWIN W. KLEINMAN, Hailey.

Illinois

To Ann Arbor, Mich., University of Michigan, for instruction, from Johns Hopkins Medical School, Major DEAN D. LEWIS, Chicago.

To Camp Doniphan, Fort Sill, Okla., as Divisional Tuberculosis Specialist, from Fort Oglethorpe, Capt. ROY T. RODAWAY, Chicago.

To Camp Grant, as member of the tuberculosis board, Lieut. JOSEPH S. LUNDHOLM, Rockford.

To Camp MacArthur, Waco, Texas, as member of tuberculosis board, from Camp MacArthur, Capt. HENRY ROBENSTEIN, Chicago.

To Camp McClellan, Anniston, Ala., as divisional tuberculosis specialist, Lieut. WALTER S. CONN, Naperville.

To Camp Pike, Little Rock, Ark., for temporary duty, Lieut. FREDERICK I. BROWN, Chicago.

To Camp Shelby, Hattiesburg, Miss., for duty, Lieut. EDWARD V. DEL BOCARRO, Chicago.

To Camp Sheridan, Montgomery, Ala., as divisional tuberculosis specialist, from Fort Oglethorpe, Capt. JOHN E. DOLAN, Chicago.

To Camp Sherman, Chillicothe, Ohio, for duty, Lieut. CHARLES J. TIERNEY, Cicero.

To Camp Wheeler, Macon, Ga., as divisional tuberculosis specialist, from Fort Oglethorpe, Capt. JAMES A. BRITTON, Chicago.

To Fairfield, Ohio, Wilbur Wright Field, Signal Corps, Aviation School, for duty, Lieut. CLEVELAND C. MACLANE, Chicago.

To Fort Douglas, Utah, as gas instructor, from Camp Doniphan, Lieut. CARL L. BARNES, Chicago.

To Fort Leavenworth, Kan., department laboratory, for duty, from Fort Riley, Lieut. MAYER A. NEWHAUSER, Chicago.

To Fort McPherson, Ga., for duty, Lieut. OLIVER P. BRITTIN, Petersburg.

To Fort Oglethorpe for duty, from Camp Gordon, Lieut. HUDSON McB. GILLIS, Wood River. For instruction, from Camp Wheeler, Lieut. EDWARD BUCKMAN, Chicago.

To Fort Riley for instruction, from Fort Riley, Capts. CHARLES H. POWELL, Old Ripley; CLARENCE W. CHAPIN, Weldon; for instruction Lieuts. WILLIAM R. WHITLEY, Chicago; ALVA E. McREYNOLDS, Peoria.

To Fort Snelling, Minn., for duty, from Fort Riley, Lieut. THOMAS D. CANTRELL, Bloomington.

To Rockefeller Institute for instruction and on completion *to his proper station,* from Fort Slocum, Major HENRY E. LEWIS, Chicago.

Indiana

To Camp Sheridan, Montgomery, Ala., for duty, from Camp Shelby, Lieut. FORREST L. REESE, Bicknell.

To Camp Travis, Fort Sam Houston, Texas, for duty, from Camp Travis, Lieut. EVERETTE F. GRAVE, Monrovia.

To Camp Upton, Long Island, N. Y., for duty, from Fort Oglethorpe, Major GEORGE L. GUTHRIE, Indianapolis.

To Camp Zachary Taylor, Louisville, Ky., for duty, Capt. EDWARD B. IMEL, Petersburg.

To their homes and honorably discharged on account of physical disability existing prior to entrance into the service, Capt. CLAUSIUS H. WHITE, Monrovia; Lieut. ALBERT G. GRUBB, Mongo.

Iowa

To Camp Beauregard, Alexandria, La., for duty, Lieut. ROBERT H. LOTT, Waverly.

To Camp Dodge, for duty, Lieut. HUGH P. BARTON, Davenport.
To Fort Oglethorpe for instruction, Capt. LEO E. EVENS, Waterloo.
To Fort Riley for instruction, Capt. EDWARD C. AYRES, Lorimor.

Kansas

To Camp Greene, Charlotte, N. C., as divisional tuberculosis specialist, from Fort Oglethorpe, Lieut. JACOB H. HALDEMAN, Paola.
To Fort Riley for instruction, Lieut. NOBLE E. MELLENCAMP, Dodge City; from Fort Riley, Lieuts. CHARLES M. MILLER, Oakley; SAM M. MYERS, Potter; LEONIDAS T. BROWN, Spearville.
To his home and honorably discharged, Lieut. GEORGE E. KNAPPENBERGER, Mankato.

Kentucky

To Camp Sheridan, Montgomery, Ala., for duty, Lieut. MICHAEL J. HENRY, Louisville.
To Fort Oglethorpe for instruction, Capts. JOHN T. PRICE, Harrodsburg; AMPLIAS W. DAVIS, Morton's Gap; Lieut. JOHN B. FLOYD, Louisville.
To Fort Riley, for instruction from Camp Grant, Capt. ALFRED H. KELLY, Shively; from Fort Riley, Lieuts. WILLIAM C. WORTHINGTON, Clintonville; HERMAN T. CARTER, Gilbertsville; JOHN C. ROGERS, Louisville; WASHINGTON I. BERRY, Washington; JAMES C. GRAHAM, Webbs.
To Louisville to recruit for the medical department of the Army, Capt. PHILIP E. BLACKERBY, Bowling Green.

Louisiana

To Fort Oglethorpe for instruction Lieut. WILLIAM L. STEWART, Pollock.
To Lake Charles, Gerstner Field, Signal Corps, Aviation School, for duty, Lieut. MICHAEL F. MORVANT, New Orleans.
To Laurel, Maryland, for duty, from Army Medical School, Lieut. TRUSS M. BRISTER, Bogalusa.
To Washington, D. C., Government Hospital for the Insane, for intensive training, from Fort Oglethorpe, Lieut. EDWIN M. LECY, Jackson.

Maine

To Camp Sevier, Greenville, S. C., for temporary duty, Lieut. THOMAS A. FOSTER, Portland.

Maryland

To Camp Sevier, Greenville, S. C., as divisional tuberculosis specialist, from Camp Sevier, Capt. WILLIAM H. YEAKER, State Sanatorium.
To Camp Wheeler, Macon, Ga., for duty, and on completion *to his proper station,* Major WILLIAM H. WELCH, Capt. ISIDORE I. HIRSCHMAN, Baltimore.
To Fort McHenry for duty, Lieut. MORRIS B. LEVIN, Baltimore.
To Fort Oglethorpe for duty, from Camp Wadsworth, Capt. THOMAS K. CONRAD, Chevy Chase.
To his home and the inactive list, Lieut. HAROLD C. BEAN, Baltimore.

Massachusetts

To Camp Devens for duty, Lieut. HORACE GRAY, Boston.
To Camp Doniphan, Fort Sill, Okla., for duty, Major GEORGE A. CRAIGIN, Boston.
To Camp Greene, Charlotte, N. C., for temporary duty, Lieut. RICHARD S. EUSTIS, Cambridge.
To Camp Hancock, Augusta, Ga., as divisional tuberculosis specialist, from Fort Oglethorpe, Capt. FRANCIS R. BURKE, Quincy.
To Camp Jackson, Columbia, S. C., for temporary duty, Capt. BRONSON CROTHERS, Cambridge.
To Camp Logan, Houston, Texas, as divisional tuberculosis specialist, from Fort Oglethorpe, Capt. WILLIAM M. GAY, Sharon.
To Camp Sevier, Greenville, S. C., for temporary duty, Lieut. GEORGE W. PAPEN, Boston.
To Camp Wheeler, Macon, Ga., for duty, from Fort Oglethorpe, Lieut. WILLIAM R. MORRISON, East Boston.
To Fort Myer, Va., for duty, from Fort Oglethorpe, Lieut. JOHN McK. CLAFFY, Springfield.
To Fort Oglethorpe for instruction, Lieut. KENNETH L. DOLE, Jamaica Plain.
To New York City, Neurological Institute, for instruction, from Camp Devens, Capt. DAVID D. SCANNELL, Boston.
To Rockefeller Institute for instruction and on completion *to Army Medical School* for duty, Lieut. DAVID B. MEDALIA, Boston.
To San Francisco, Calif., Lettermann General Hospital, for duty, from Camp Kearny, Capt. SIDNEY M. BUNKER, Boston.
To Washington, D. C., for duty, from Fort Banks, Capt. BEN H. METCALF, Winthrop.
To his home and inactive list, Major SAMUEL J. MIXTER, Boston.
To his home and honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. EMIL U. DILLENBACK, Springfield.

Michigan

To Camp Upton, Long Island, N. Y., for duty, from Cornell Medical College, Lieut. THEODORE KOLVOORD, Battle Creek.
To Cape May, N. J., and on completion *to his proper station,* Major WALTER R. PARKER, Detroit.
To Fort Oglethorpe for instruction, from Camp Jackson, Capt. CHARLES H. MERRILL, Detroit.
To Fort Riley, for instruction, from duty as a private at Camp Custer, Lieut. MYRON G. BECKER, Benton Harbor.
To Long Island City, Long Island, N. Y., for temporary duty, Lieut. CALVIN R. ELWOOD, Menominee.
To New York City, Neurological Institute, for instruction, Lieut. WILLIAM R. McCLURE, Detroit.
To San Antonio, Texas, Brooks Field, for duty, from Kelly Field, Capt. HENRY S. BARTHOLOMEWS, Lansing.

Minnesota

To Camp Beauregard, Alexandria, La., for duty, Lieut. ALBERT E. JOHANN, Minneapolis.
To Dansville, New York, for duty, Capt. JOSEPH M. A. GRAVELL, St. Paul, Lieut. LOUIS R. KOLLER, South Minneapolis.
To Fort Omaha, Neb., as gas instructor, from Camp Doniphan, Lieut. BRET V. BATES, Wheaton.
To Fort Sam Houston, Texas, for assignment to duty, Lieut. FRANCIS G. BLAKE, Minneapolis.
To Memphis, Tenn., Park Field, Signal Corps, Aviation School, for duty, Lieut. GROVER C. BLACK, Minneapolis.
To Washington, D. C., for duty in the Surgeon-General's Office, from duty as medical advisor to the Governor of Minnesota, Major WILLIAM J. MAYO, Rochester.
Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. WARD AKESTER, Marshal.

Mississippi

To Camp Greene, Charlotte, N. C., for duty, from Camp Greene, Lieut. GEORGE D. MASON, Clara.
To Camp Sheridan, Montgomery, Ala., for temporary duty, from Fort Oglethorpe, Lieut. MAURY H. McRAE, Corinth.
To Fort Oglethorpe for instruction, from Camp Greene, Lieut. VIRGIL N. NICHOLS, Carson.
To New York City, Neurological Institute, for instruction, from Camp Hancock, Augusta, Ga., Capt. FREDERIC HAGLER, St. Louis.

Missouri

To Camp Pike, Little Rock, Ark., for duty, Lieut. CLAY SPENCER, Rushville.
To Camp Sherman, Chillicothe, Ohio, for duty, from Fort Riley, Capt. WILLIAM J. SAY, St. Louis.
To Camp Travis, Fort Sam Houston, Texas, as member of tuberculosis board, from Fort Riley, Lieut. ALLEN G. WAINWORTH, St. Louis.
To Camp Upton, Long Island, N. Y., for duty, from Cornell Medical College, Lieut. REZIN C. SHAWHAN, Hale.
To Fort McPherson, Ga., for duty, Major JOHN F. BINNIE, Kansas City.
To Fort Oglethorpe for instruction, from Camp Doniphan, Capt. CLAUDE E. FRAZIER, Kansas City; from Camp Wheeler, Capt. SOLON CAMERON, St. Louis.
To Fort Riley for instruction, Capt. JAMES F. COOPER, Hannibal; from Camp Pike, Capt. AUGUST A. GOSSOW, St. Charles. For instruction, Lieuts. JAMES C. McKAY, Kennett; WILLIAM G. HOGAN, Neck City; from Fort Riley, FREDERICK H. BROWN, Billings.
To Hot Springs, Ark., Army and Navy General Hospital, for duty, Capt. JAMES G. CALHOUN, St. Louis.
To Memphis, Tenn., Park Field, Signal Corps, Aviation School, for duty, Lieut. RALPH E. JONES, Vichy.
To New York City, for inspection and on completion *to his proper station,* Major FREDERICK W. BAILEY, St. Louis.
To Williamsbridge, N. Y., for duty, from Cornell Medical College, Lieut. ZACHARIAN C. JONES, Kansas City.

Montana

To Fort Oglethorpe for duty, from Camp Sheridan, Lieut. KARL A. SNYDER, Great Falls.
To Fort Riley for instruction, Lieut. JAMES B. REYNOLDS, Great Falls.

Nebraska

To Fort Oglethorpe for duty, Lieut. GEORGE W. COVEY, Lincoln.
To Fort Riley for instruction, Lieuts. JAMES E. M. THOMSON, Lincoln; from Fort Riley, WILLIAM O. AKERS, Florence.
To Memphis, Tenn., Park Field, Signal Corps, Aviation School, for duty, Lieut. VINCENT L. JONES, Omaha.
To their homes and honorably discharged on account of physical disability existing prior to entrance into the service, Lieuts. CLELAND G. MOORE, Omaha; CHARLES N. MERIWETHER, Pauline.

Nevada

To Camp Lewis, American Lake, Wash., as consultant in orthopedic cases, from duty, as a private at Camp Lewis, Lieut. RAY V. LAZALERE, Kimberly.
To Fort Riley for instruction, Lieut. JOHN G. KITCHEN, Mine.

New Hampshire

To his home and honorably discharged on account of physical disability existing prior to entrance into the service. Lieut. ERNEST W. LOWE, Fremont.

New Jersey

To Albany, N. Y., for duty, Lieut. ROBERT J. CHILDERS, Plainfield.
To Fort Porter, N. Y., for temporary duty, Capt. HARRY VAUGHAN, Morristown.

To Fort Riley, for instruction, from Fort Riley, Lieut. CHARLES ENGLANDER, Cedar Grove.

To Garden City, Long Island, N. Y., Aviation Section, Signal Corps for duty, Lieut. GEORGE GINSBERG, Hoboken.

To Laurel, Md., for duty, from Camp Zachary Taylor, Capt. LUCIUS F. DONOHOE, Bayonne; from Army Medical School, Lieut. THOMAS M. MORRIS, Cranford.

To Morrison, Va., Aviation Section, Signal Corps, for duty, Lieut. ERNESTO CASINI, Garfield.

To his home and the inactive list, from Army Medical School, Lieut. THOMAS L. PELLETT, Hamburg.

New York

To Albany, N. Y., for duty, Capt. REXWALD BROWN; from Camp Travis, Capt. FRED M. MEADER, New York City; from Camp Wheeler, Capts. EDWIN L. DRAPER, CLINTON B. HAWN, Albany; from Camp Upton, Lieut. JONATHAN PEARSON, Schenectady; from Cornell Medical College, Lieut. WILLIAM D. HOWARD, Albany; from Rockefeller Institute, Lieut. HARRY C. SCHMEISSER, New York City.

To Camp Beauregard, Alexandria, La., for duty, from Camp Logan, Lieut. WALTER S. BENNETT, Glens Falls.

To Camp Devens, Ayer, Mass., for temporary duty, from Camp Devens, Capt. GEORGE B. BROWN, Saratoga Springs.

To Camp Dix, Wrightstown, N. J., as member of a board to examine the command in nervous and mental diseases, Lieuts. EUGENE W. BOUDREAU, Asbury; WILLIAM G. DICKINSON, Oneonta.

To Camp Greene, Charlotte, N. C., as divisional tuberculosis specialist from Camp Dix, Capt. HENRY C. DREW, Brooklyn; for assignment to duty, from Fort Oglethorpe, Lieut. GILBERT A. ASHMUN, Brooklyn.

To Camp Sevier, Greenville, S. C., for duty, Capt. SAMUEL W. SCHAPIRA, New York City.

To Camp Travis, Fort Sam Houston, Texas, as member of tuberculosis board, from Fort Riley, Lieut. EUGENE CALVELLI, New York City. For temporary duty, Lieut. FRANK E. FOX, Fulton.

To Camp Wadsworth, Spartanburg, S. C., for duty, Lieut. VINXENZO PASCALE, New York City.

To Dansville, for duty, Capt. HICKSON F. HART, Peekskill.

To Fort Dupont, Del., to conduct a medical examination in his specialty and on completion *to his proper station,* Capt. SANGER BROWN, II, White Plains.

To Fort Monroe, Va., for duty, from Army Medical School, Lieut. LOUIS M. PASTOR, Kings Park, Long Island.

To Fort Myer, Va., for duty, from Fort Oglethorpe, Lieut. BENJAMIN RABBINER, Brooklyn.

To Fort Oglethorpe for duty, Lieut. DANIEL J. SWAN, Brooklyn; for instruction, Lieuts. SAMUEL PERLMAN, Brooklyn; THOMAS J. LUBY, ORVILLE H. RICHER, New York City.

To Fort Riley for duty, Lieut. SAMUEL T. NICHOLSON, JR., Clifton Springs. For instruction Lieut. FREDERICK D. KEPPEL, Tincklaen.

To Garden City, Long Island, Aviation Section, Signal Corps, for duty, Lieuts. MORRIS AUSLANDER, Bronx, New York City; JACOB N. COHEN, Brooklyn; HARRY FRIED, JAMES V. SMITH, JOSEPH I. WALLACH, New York City.

To Laurel, Md., for duty, from Army Medical School, Lieuts. FLOYD J. ATWELL, Cooperstown; WILLOUGHBY C. PENDILL, Huntington.

To Macon, Ga., Collegiate Balloon School, for duty, from Camp Wheeler, Lieut. JOHN A. MORRISSEY, Newark.

To Mineola, Long Island, Hazelhurst Field, Signal Corps, Aviation School, for duty, Lieut. HENRY A. SUSSMAN, Brooklyn.

To Morrison, Va., Aviation Section, Signal Corps, for duty, Lieuts. WILLIAM H. FERRIERS, Fairport; BURTON L. STERNER, New Brighton, Staten Island; EDWIN M. WEIL, New York City.

To New York City for temporary duty, Capt. HARRY M. WEED, Buffalo. Orthopedic Hospital, for orthopedic instruction and on completion *to his proper station,* from Rochester, Capt. CHARLES W. HOYT, Rochester. Cornell Medical College, for instruction from Fort Oglethorpe, Lieut. ALEXANDER W. JACOBS, Bronx, New York City. For duty, from Fort Oglethorpe, Lieut. LOUIS GOLD, Brooklyn; Neurological Institute. For intensive training, Lieut. WALTER F. STILLGER, New York City.

To their homes and honorably discharged on account of physical disability existing prior to entrance into the service, Capts. FRANCIS W. McGUIRE, Buffalo; BURTON S. BOOTH, Troy; Lieuts. LOUIS E. BRESLAU, Brooklyn; WILLIAM J. JACOBS, Carthage.

North Carolina

To Camp Greene, for duty, from Camp Greene, Lieuts. ROBERT P. BECKWITH, Rosemary; ROBERT J. LOVILL, Wingate.

To Camp Shelby, Hattiesburg, Miss., for temporary duty, from Camp Greene, Lieut. MICHEL SALIBA, Wilson.

To Camp Wheeler, Macon, Ga., for duty, from Camp Lee, Capt. SYLVESTER D. CRAIG, Winston Salem.

To Fort Oglethorpe for instruction, Lieut. WILLIAM MONCURE, JR., Hamlet.

To Morrison, Va., Aviation Section, Signal Corps, for duty, Lieut. JAMES G. RABY, Tarboro.

To their homes and honorably discharged Lieuts. THOMAS B. HENDERSON, Henderson; GLENN LONG, Newton.

Ohio

To Camp Cody, Deming, New Mexico, for duty, from Fort Leavenworth, Capt. JAMES F. ELDER, Youngstown.

To Camp Devens, Ayer, Mass., for duty, from Fort Riley, Lieut. ALBERT G. EYESTONE, Gibsonburg.

To Camp Sherman, for temporary duty, Lieut. ROYAL G. GROSSMAN, Cleveland.

To Camp Travis, Fort Sam Houston, Texas, for temporary duty, from Eagle Pass, Texas, Lieut. FRANCIS W. McNAMARA, Youngstown.

To Fairfield, Wilbur Wright Field, Signal Corps, Aviation School, for duty, Lieut. JOSEPH R. MONTGOMERY, Steubenville.

To Fort McHenry, Md., for temporary duty and on completion *to his proper station,* Capt. CARROLL L. STOREY, Oberlin.

To Fort Oglethorpe for instruction, Capt. ORIN W. ROBE, Portsmouth; from Camp Jackson, Capt. WILLIAM S. P. DONEHOO, Wintersville. For instruction, Lieuts. RALPH S. HOSLER, Amanda; HENRY L. PRICE, Toledo. For duty, from Camp McClellan, WILLIAM S. NICHOLS, Cleveland.

To their homes and honorably discharged, Major WILLIAM F. MARTING, Ironton; Lieuts. JOHN H. SCHROEDER, Cincinnati. On account of physical disability existing prior to entrance into the service, Lieuts. DANIEL HEIMLICH, Cleveland; IVAH J. SANSBOTTOM, Coldwater.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. CLINTON C. SHRADER, Toledo.

Oklahoma

To Fort Riley, for instruction, Lieut. FREDERICK R. SUTTON, Bartlesville.

To Oklahoma City as instructor, Lieut. REUBEN M. HARGROVE, Norman. For orthopedic instruction, from San Antonio, Lieut. GARDNER H. APPLEWHITE, Shawnee.

To St. Louis, Washington University, for instruction in urology and dermatology, from Fort Leavenworth, Lieut. JOSEPH H. SANFORD.

Oregon

To Fort Riley, for instruction, from Camp Lewis, Lieut. GEORGE G. CARL, John Day.

To Los Angeles, for orthopedic instruction, from Fort D. A. Russell, Capt. RICHARD B. DILLEHUNT, Portland. For instruction in orthopedic surgery, Lieuts. CHESTER A. DOWNS, Portland; VICTOR L. ROCHO, Woodburn.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. JAMES C. MATTHIS, Monmouth.

Pennsylvania

To Camp Bowie, Fort Worth, Texas, for duty, from Camp Meade, Major THOMAS W. JACKSON, Philadelphia.

To Camp Dix, Wrightstown, N. J., as senior officer of a board to examine the command in nervous and mental diseases, from Newport News, Capts. RALPH L. HILL, Woodville. As member of board to examine the command in nervous and mental diseases, Capt. PERCY DELONG, Philadelphia; from Hoboken, Lieut. MATTHEW C. BAINES, Philadelphia. For duty, Lieut. KARL S. SIMPSON, Pittsburgh; from Camp Grant, Lieut. EDGAR N. FOUGHT, Philadelphia.

To Camp Greene, Charlotte, N. C., for temporary duty, Lieut. WALTER E. BROWN, Pittsburgh.

To Camp Jackson, Columbia, S. C., for duty, from Fort Oglethorpe, Lieuts. FRANCIS M. B. SCHRAMM, Johnstown; SAMUEL FIRESTONE, JR., McKeesport.

To Camp McClellan, Anniston, Ala., as divisional tuberculosis specialist, from Fort Oglethorpe, Lieut. ANDREW ANDERS, Philadelphia.

To Camp Travis, Fort Sam Houston, Texas, as member of tuberculosis board, from Fort Riley, Lieut. MAURICE I. STEIN, New Bloomfield.

To Camp Upton, Long Island, N. Y., for duty, from Fort Oglethorpe, Lieut. CARL F. KOENIG, Philadelphia.

To Camp Wadsworth, Spartanburg, S. C., as divisional tuberculosis specialist, from Camp Gordon, Capt. ALBERT P. FRANCIS. For duty, Lieut. SAMUEL SINGER, Philadelphia.

To Camp Wheeler, Macon, Ga., for duty, Lieut. CHARLES R. HUGHES, Philadelphia.

To Fort Oglethorpe, for instruction, Lieuts. WILLIAM F. HERBST, Allentown; EZRA P. DICKINSON, St. Michael; PATRICK F. McHUGH, Wilkes-Barre.

To Mineola, Long Island, N. Y., Hazelhurst Field, Signal Corps, Aviation School, for duty, Lieut. ELLIS C. WINTERS, Ford City.

To New York City, Neurological Institute, for instruction, from Camp Lee, Major EWING W. DAY, Pittsburgh.

To Rockefeller Institute, for instruction, and on completion *to his proper station,* Capt. JAMES D. BLEVINS, Pittsburgh.

To their homes and honorably discharged on account of physical disability existing prior to entrance into the service, Major JOHN F. CULP, Harrisburg; Lieut. JESSE B. HOWE, Erie.

To their homes and honorably discharged, Lieuts. CHARLES E. PEACH, Pine Grove; HOWARD A. COLLINS, Winberne.

Porto Rico

To Camp Joseph E. Johnston, Jacksonville, Fla., for duty, from Camp Hancock, Capt. EMMET I. VAUGHN, Central Aguirre.

Rhode Island

To Garden City, Long Island, N. Y., Aviation Section, Signal Corps, for duty, Lieut. GEORGE A. RICE, Providence.

To Fort Oglethorpe, for duty, from Fort Oglethorpe, Lieut. CHARLES F. GORMLY, Providence.

South Carolina

To his home and honorably discharged on account of physical disability existing prior to entrance into the service, Capt. FRENCH A. SMITH, Mullins.

Tennessee

To Camp Meade, Annapolis Junction, Md., Capt. THOMAS P. MILLER, Knoxville. For duty, from Fort Myer, Lieut. ALLEN L. LEAR, Sewanee.

To Camp Pike, Little Rock, Ark., for duty, Lieut. DAVID DEW. MONCRIEF, Shelbyville.

To Fort Oglethorpe, for instruction, Capt. CHARLES PENDER EDWARDS, Kingsport; Lieut. ALEXANDER J. BRYANT, Sharon.

To San Antonio, Texas, Kelly Field, for assignment, from Austin, Texas, Lieut. FLEMING J. O'CONNOR, Jackson.

To Washington, D. C., Government Hospital for Insane, for intensive training, Lieut. WILLIAM B. LUNSFORD, Nashville.

To his home and honorably discharged, Lieut. CHARLES H. KYLER, Oliver Springs.

Texas

To Camp Devens, Ayer, Mass., for duty, from Fort Oglethorpe, Lieut. ERNEST J. STEVES, San Antonio.

To Camp Pike, Little Rock, Ark., for temporary duty, Lieut. EDWARD T. MILLER, Newton.

To Camp Shelby, Hattiesburg, Miss., for duty, Capt. JAMES W. GARTH, Beaumont.

To Camp Travis, Fort Sam Houston, for duty, from Camp Travis, Capt. GEORGE S. MILNES, Houston.

To Camp Upton, Long Island, N. Y., for duty, from Fort Oglethorpe, Lieut. JESSE L. HALL, Bertram.

To Fort Logan H. Roots, Little Rock, Ark., for temporary duty, from Fort Oglethorpe, Lieut. ROBERT L. HOWELL, Snyder.

To Fort McPherson, Ga., for duty, Lieut. CHARLES W. STEVENSON, Loraine.

To Fort Myer, Va., for duty, from Fort Oglethorpe, Lieut. ROGER ATKINSON, Pleasanton.

To Fort Riley, for instruction, Lieuts. ROBERT V. MURRAY, Austin; JAMES H. HAPPEL, Cleburne.

Vermont

To Fort Monroe, Va., for duty, from Fort Monroe, Lieut. LEWIS F. McCARTHY, Essex.

To Williamsbridge, N. Y., for duty, from Cornell Medical College, Lieut. RAY B. THOMAS, Enosburg Falls.

Virginia

To Camp Meade, Annapolis Junction, Md., for duty, from Camp Meade, Lieut. FRANK LEVINSON, Hopewell.

To Fort Oglethorpe, for instruction, Lieuts. WADE CLEVELAND PAYNE, Haymarket; PAUL DAVIS, Roanoke.

To Morrison, Va., Aviation Section, Signal Corps, for duty, Lieut. ALLEN C. BILLER, Forestville.

Washington

To Camp Dodge, Des Moines, Iowa, for duty, from Camp Dodge, Lieut. HENRY W. BORTNER, Sultan.

To Camp Lewis, for temporary duty, Capt. ALFRED J. HELTON, North Yakima.

To Fort Riley, for instruction, Lieut. PIUS A. ROHRER, Spokane.

To Los Angeles, for instruction in orthopedic surgery, Capt. EVERETT O. JONES, Seattle. For orthopedic instruction, and on completion of this course *to his proper station,* from Fort Worden, Capt. RICHARD C. HILL, Irondale.

To Portland, Ore., United States Signal Corps, for duty, Lieut. LORENZO S. DEWEY, Okanogan.

To report by wire to the commanding general, Western Department, for assignment to duty, from duty as a private at Camp Lewis, Lieut. VEZIO C. UNGHERINI, Camp Lewis.

West Virginia

To Camp Greene, Charlotte, N. C., for assignment to duty, from Fort Oglethorpe, Capts. ALBERT L. GRUBB, Berkeley Springs; BARRICK S. RANKIN, Tunnelton.

To Fort Myer, Va., for duty, from Fort Oglethorpe, Lieuts. GEORGE P. McCOY, Franklin; WILLIAM E. WHITESIDE, Harrisville.

To Fort Oglethorpe, for instruction, Lieuts. THURMAN E. VASS, Bluefield; JOHN P. FARSON, Charleston; AUBREY F. LAWSON, Weston.

To his home and honorably discharged, Lieut. CONRAD F. SAYRE, Mason.

Wisconsin

To Camp Pike, Little Rock, Ark., for duty, Capt. HOMER SYLVESTER, Montfort.

To Fort Oglethorpe, for instruction, Lieut. DEXTER H. WITTE, Hartford.

To Memphis, Tenn., Park Field, Aviation School, Signal Corps, for duty, Lieut. EARL L. SHARP, Plymouth.

To Mineola, Long Island, Hazelhurst Field, medical research board, aviation section, signal corps, for duty, and on completion *to Camp Upton,* Long Island, N. Y., and on completion *to his proper station,* Major NELSON M. BLACK, Milwaukee.

To Williamsbridge, N. Y., for duty, from Cornell Medical College, Lieut. HARRY B. PODLASKY, Milwaukee.

To his home and honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. JOHN R. HUGHES, Dodgeville.

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST; SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION, PUBLIC HEALTH, ETC.)

CALIFORNIA

New Officers.—San Mateo County Medical Society, at San Mateo, February 7: president, Dr. F. Holmes Smith, San Bruno, and secretary, Dr. Frank S. Gregory, Redwood City.

California Law Upheld.—The United States Supreme Court January 21, decided that the California medical practice act licensing and governing healers of the sick is constitutional. The validity of the law had been attacked by a chiropractor on account of the alleged discrimination in favor of Christian Scientists.

Personal.—Dr. Wilfred H. Kellogg, Berkeley, was elected secretary and executive officer of the state board of health at its meeting, held at Sacramento, February 2. He succeeds Dr. Wilbur A. Sawyer, Sacramento, resigned to enter military service. Dr. Frank L. Kelly, Berkeley, succeeds Dr. Kellogg as epidemiologist and director of the state bureau of communicable diseases.——Dr. Lester Keller has been reelected secretary of the Yorba Linda Chamber of Commerce.

CONNECTICUT

Health Association Officers.—At the annual meeting of the Connecticut Public Health Association, Dr. Stephen J. Maher, New Haven, was elected president; Dr. Charles J. Bartlett, New Haven, vice president, and Dr. Charles P. Botsford, Hartford, secretary.

Personal.—Drs. Karl B. Bretzfelder and W. F. Westevelt, New Haven, have been elected members of the staff of the Grace Hospital, New Haven.——Dr. Charles Fitzgerald, Hartford, for two years in the service of the Austrian government, has returned to the United States.——Dr. Anthony J. Hill, formerly of Torrington, who was committed to the Norwich State Hospital in 1914, has been missing from the state hospital for several months, and all trace of him is said to have been lost.

COLORADO

Cooperation in Prevention of Venereal Diseases.—The city council of Denver has passed an ordinance which was signed by the mayor, Feb. 19, 1918, in pursuance of the general plan of cooperation by state, county and municipal governments with the military and public health authorities of the United States, declaring syphilis, gonorrhea and chancroid communicable diseases dangerous to the public health, and requiring physicians, hospitals, sanatoriums and other institutions to report all such cases within forty-eight hours after coming to their knowledge, to the manager of health and charity, with the name, address and occupation of the afflicted person. It also requires persons having such diseases, whether they consult a physician or not, to report within forty-eight hours to the same department. Druggists or other persons filling prescriptions or selling medicines for the relief of such diseases must also keep a record and make a like report to the department. The records shall be confidential and not open for public inspection, but any person giving a false name or address or occupation shall be deemed guilty of a violation of the ordinance.

GEORGIA

The J. B. White Fund.—Among the many claims for the J. B. White Fund which have been presented to the committee in charge were the building of clinics, laboratories, and a dispensary in connection with the medical college of the University of Georgia, Augusta.

Personal.—Dr. William W. Meriwether, an intern at the Macon Hospital, who has been on trial on the charge of involuntary manslaughter, was acquitted, February 8. It was charged that Dr. Meriwether had been negligent in administering ether during an operation for the reduction of a fracture of the arm.——Dr. Melville C. Martin, Atlanta, has been reelected physician to the city prison for the fourteenth executive term.——Dr. Claude A. Smith has resigned as pathologist of Atlanta and has been succeeded by Dr. Elmore C. Thrash.——Dr. Robert G. Stone, Hawkinsville, has been appointed a member of the medical staff of the state sanatorium, Milledgeville.

ILLINOIS

Personal.—Dr. Josephine Milligan, Jacksonville, has been called for service in France, through the Rockefeller Foundation, and will work directly under the French government.

Drake Makes Tour of Army Camps.—Dr. C. St. Clair Drake, Springfield, director of the state department of health, has just returned from a trip of three weeks during which he visited army camps in Missouri, Arkansas, Tennessee, Mississippi, Louisiana and Kentucky. Dr. Drake made this trip as a representative of the communicable disease department of the United States Public Health Service, and conferred with the state health authorities regarding the spread of venereal diseases and other communicable diseases in the zones surrounding military camps.

Chicago

Medical Charities Need Funds.—It is announced by John E. Ransom, chairman of the Central Council of Social Agencies, that twelve hospital, medical and nursing agencies in Chicago need $200,000 outside of all regular sources of income for their work planned for this year.

War and the Medical Profession.—At conferences held, February 15 to 17, inclusive, at the Northwestern University building under the auspices of the Young Men's Christian Association and the student volunteer movement for foreign missions, the general topic for discussion was "The War and the World Responsibility of the Medical Profession." On the second evening, Dr. William A. Evans spoke on "Some Achievements of the American Doctors and Nurses in the Various War Zones."

Personal.—Dr. and Mrs. Hugh T. Patrick have left for California to spend the rest of the winter.——Dr. N. Elizabeth Todd was awarded $20,000 damages against the Madison Building Company on February 23, by a jury in Judge Torrison's court. Dr. Todd was crushed by an elevator in the American Bank Building in 1914, and entered suit for $75,000 damages.——Dr. Emma W. Gillmore has arrived in Chattanooga to take charge of the physical examination of female restaurant employees in the military zone near Chattanooga.

INDIANA

Osteopath on Health Board.—Much opposition was aroused at Frankfort, recently, because an osteopath had been appointed as secretary of the county board of health. The legality of the appointment of one not licensed as a physician is questioned.

Compulsory Vaccination Authorized.—By a vote of six to three, the city council of Indianapolis passed an ordinance authorizing the city board of health to enforce vaccination whenever there is an epidemic or danger of an epidemic of smallpox. This ordinance applies only to those who have never been successfully vaccinated and would affect perhaps not more than 25 per cent. of the population.

State Tuberculosis Society Officers.—At the annual meeting of the Indiana Society for the Prevention of Tuberculosis held in Evansville, February 1 and 2, Dr. Roscoe L. Sensenich, South Bend, was elected president, and Drs. Gardner C. Johnson, Evansville; Henry B. Shacklett, New Albany; Walter A. Gekler, Terre Haute; A. J. Garrish, Seymour; William J. Martin, Kokomo, and Otis B. Nesbit, Gary, were elected as members of the board of directors.

Personal.—Dr. E. P. Davenport, Craigville, suffered a cerebral hemorrhage while staying at Ossian, January 26, and is reported still to be in a serious condition.——Dr. William H. Long, now special smallpox physician of Indianapolis, has been appointed contagious disease physician to succeed Dr. William H. Dowd, resigned.——Dr. Gardner C. Johnson, Evansville, was elected vice president of the Association of Secretaries of Anti-Tuberculosis Societies held at Evansville, February 1.

Car Sanitation.—Inspectors from the state board of health and the public service commission have started an inspection and investigation of the service and sanitary conditions on the cars of the Union Traction Company of Indiana, following numerous complaints to the state agencies concerning conditions of service and cars operating between Indianapolis and Fort Benjamin Harrison. If the insanitary conditions of which complaint is made are found, Dr. Hurty, state health commissionr, said that evidence will be laid before the prosecuting attorneys of the counties involved, with instructions that prosecutions shall be brought against the traction company under the general sanitary law, which makes "generating, transmitting or promoting disease" a crime.

IOWA

Hospital Offered Grinnell.—The Sisters of St. Francis, Clinton, have submitted a proposition to the citizens' hospital committee at Grinnell, that they propose to erect and maintain a modern hospital with thirty-five beds, and a four-bed contagious disease annex in Grinnell, and to open a training school for nurses, contingent on the citizens' purchasing a 5-acre site in the city of Grinnell and donating $15,000 in cash before July 1, 1918.

Personal.—Rewel H. Sylvester, director of the psychologic clinic of the University of Iowa, Iowa City, has gone to Fort Oglethorpe, Ga., as a member of the psychologic examining group of the cantonment at that post.——Dr. John P. Sprague, head of the department of hygiene and physical education at Grinnell College, has been called to Washington as assistant to Major Philip S. Doane, Chicago, national director of health and sanitation for the United States Shipping Board.

Venereal Disease Organization.—Dr. Robert A. Weston, Des Moines, has been placed in charge of the newly organized venereal disease unit at Des Moines. He has working with him one male and one female nurse, two social service nurses and four policemen. The clinic is housed in three rooms in the basement of the new city hospital, and is open between 12:30 and 2:30 daily. Eventually an internment will be established, where all persons found to be suffering from venereal diseases will be placed.

KENTUCKY

Salary Changes and Appointments.—The new fiscal court, composed of three of the newly elected county commissioners, has reduced the salary of the county health officer to $2,500 from $3,500; appointed Melville Dailey, sanitary inspector, at $100 a month; allowed a salary of $100 a month to a clerk in the health office, and fixed the salary of Dr. T. M. Dorsey, county bacteriologist, at $100 a month. The court also decided that all supplies and medicines for the county health office be purchased on requisition approved by the court.

MARYLAND

New Hygiene Faculty.—Dr. William H. Welch, Baltimore, announced the following appointments to the Institute of Hygiene and Public Health to be opened in Baltimore next October: Dr. Carroll G. Bull of the Rockefeller Institute, New York, associate professor of immunology and serology, and Dr. Raymond Pearl, of the experiment station, to take charge of the department of biometry and vital statistics.

Historical Club Meets.—At the second meeting of the Historical Club of Johns Hopkins Hospital, Baltimore, February 11, Dr. David I. Macht presented a paper on "Pharmacological Appreciation of Shakespeare's Hamlet"; Dr. John C. Hemmeter, a paper on "Lavoisier and the History of the Physiology of Respiration and Metabolism: Contemporaneous Views of Life's Processes," and Dr. Howard A. Kelly presented a short paper on "America's Physiologist, Dr. John R. Young of Hagerstown."

Personal.—Dr. Charles A. Riefschneider, senior resident surgeon of the University Hospital, Baltimore, has been appointed superintendent to succeed Dr. Harry M. Stein, who has resigned to enter the military service.——Dr. Chester P. Woodward has been appointed secretary of the Baltimore Health Department, succeeding Dr. Austin H. Wood, who has entered the military service.——The residence of Dr. J. Hubert Wade, Boonsboro, was destroyed by fire, recently.——Dr. William H. Welch has been reelected president of the University Club, Baltimore.

MICHIGAN

Municipal University Planned.—Plans are on foot to establish a municipal university in Detroit, of which the Detroit College of Medicine and Surgery is to be the medical department. The city is asked to provide $30,000 a year.

Income Tax Protested.—At the meeting of the Council of the Michigan State Medical Society in Detroit, January 23, a resolution was adopted protesting against the extra 8 per cent. tax on incomes over $6,000 earned by professional men. Dr. William T. Dodge, Big Rapids, was reelected chairman of the council; Dr. Arthur L. Seeley, Mayville, vice president; Dr. Frederick C. Warnshuis, Grand Rapids, secretary, and Dr. D. Emmett Welsh, Grand Rapids, treasurer.

Personal.—Dr. Richard E. Mercer has been elected president; Dr. David H. O'Donnell, vice president, and Dr. George C. Chene, secretary-treasurer of Providence Hospital, Detroit.

——Dr. W. L. Arntz, Sunfield, who was seriously burned by an explosion of gasoline in Aberdeen, S. D., recently, has recovered and returned home.——Fred B. Jones has been appointed superintendent of the Detroit Receiving Hospital, succeeding Dr. Leo J. Dretzka, resigned to enter military service.

Venereal Clinics.—The Calhoun County Medical Society has decided to operate a free venereal clinic in Battle Creek. The clinic will make a free examination of every person who presents himself for examination, but will not treat persons who are able to pay for treatment. Since November 1 the secretary of the state board of health has been able to secure records of 2,000 cases of venereal disease and an endeavor is being made to trace the source of infection and to intern for treatment the men and women who have the disease.

MINNESOTA

City Proposes Ordinance Against Quackery.—An ordinance has been introduced in the city council of Duluth in opposition to quackery. The ordinance is being opposed by chiropractors and other irregular practitioners.

The Mayo Unit.—The Mayo Unit, Rochester, of which Major Louis B. Wilson, M. R. C., U. S. Army, is director, with Capts. Wayne W. Bissell and Arthur U. Des Jardins as assistant directors, has left for a mobilization point preparatory to sailing for France.

Excess Sanatorium Payments Refunded.—Six counties out of eight, which contributed to the establishment of a tuberculosis sanatorium at Worthington, have been refunded $1,600 from excess levies paid during 1917. The largest amount received was about $238.98, by Cottonwood County, and the smallest amount was $91.24 by Jackson County.

State Health Board to Move.—The revised budget for social hygiene work includes $4,000 for rental of offices to be shared by the state board of health and the hygiene commission. The space now occupied and the capital used by the state board are too small and requests for increased space have not been granted.

Personal.—Dr. Henry W. Cook, Minneapolis, has been chosen chairman of the "health week" committee.——Dr. Fred A. Carrell, Minneapolis, sentenced to imprisonment last October for one year, is said to have been pardoned by the state pardon board, February 7.——F. W. Cappelen, city engineer, Minneapolis, has been appointed a member of the state board of health to succeed Dr. William A. Jones, Minneapolis, term expired.——Dr. Isaac I. Gellman has resigned as resident physician of the Minnesota State Sanatorium, to accept a similar position in the Pennsylvania State Sanatorium for Tuberculosis No. 3, Hamburg.

MISSOURI

Service Flag Dedicated.—A service flag bearing twelve stars, donated by Dr. Charles Wood Fassett, St. Joseph, was dedicated at the meeting of the Buchanan County Medical Society, February 20.

Personal.—Dr. Thomas J. Rigdon, Kennett, has been appointed coroner of Dunkin County to fill the vacancy caused by the resignation of Ernest F. Harrison to join the military service.——Dr. Robert C. Forsyth, Kirkwood, suffered a loss of about $20,000 by the destruction of his house by fire, February 11.——Dr. Martha M. Bacon, Kansas City, has been recommended by the Women's International Hospital Commission for roentgen-ray service in connection with war service.——Dr. Joseph B. Hawkins, Mexico, was struck by a train at a grade crossing, February 11, and sustained a comminuted fracture of the leg.——The offices of Drs. John T. Boland, William Frye, H. L. King and Albert W. Bleil, Kansas City, were damaged by fire to the extent of $10,000, February 3.

St. Louis

Murderer of Physician Sentenced.—Jacob Stenzel, who killed Dr. Frederick L. Pohlmann, May 14, was found guilty of murder in the second degree in the criminal court, February 19, and sentenced to imprisonment for ten years in the penitentiary.

NEBRASKA

Personal.—Dr. Warren M. Phillips, assistant physician at the Norfolk State Hospital has resigned to enter the United States service.

Morbidity and Mortality Statistics of Lincoln.—During 1917, there were in Lincoln 115 deaths from the contagious diseases, including pulmonary tuberculosis and pneumonia, as against seventy-eight for the previous year. There was a total of 2,030 cases of contagious disease during 1917, as against 794 for 1916. Deaths from all causes numbered 708 in 1917, as against 668 in 1916, giving a death rate of 11.8 per thousand for the former year, as compared with 11.13 for the latter. The number of births in 1917 was 1,200 and in 1916, 1,205. The figures seem to coincide with the general increase of contagious diseases in the middle western states in 1917 over 1916. The increased number of deaths in Lincoln was confined to diphtheria, measles, lobar pneumonia and pulmonary tuberculosis. The excess of deaths from pneumonia occurred in January after an epidemic of influenza in the preceding month. The other contagious diseases showed a decrease.

NEW YORK

Preserving Vital Statistics Records.—The bureau of vital statistics of the Buffalo department of health has installed apparatus by which all certificates filed with the bureau are photographically copied and filed for record. The state law requires that the original certificates must be sent to the state department of health. The photographic method eliminates the possibility of error in copying and provides an exact reproduction of the original.

Personal.—Dr. Edward Clark, Buffalo, has been relieved of his duties as acting chief of the division of child hygiene of the state department of health at Albany, and has returned to his former duty as sanitary supervisor of the western part of the state, with station at Buffalo. Dr. Herman F. Senftner, New York City, has succeeded Dr. Edward Clark as the head of the division of child hygiene, pending the release of Dr. Henry L. K. Shaw, Albany, from military service.——About fifty physicians of Binghamton gave a dinner in honor of Dr. Daniel S. Burr, February 14, commemorating his semicentenary as a medical practitioner of Broom County.——Dr. Helen R. Pallieter has been selected as city physician of Poughkeepsie.

The Record of One Hospital.—Up to January 10, among the physicians connected with the Mount Sinai Hospital, seventy-five have been commissioned in the Medical Reserve Corps. Of these, seventeen were members of the attending staff, twenty-two members of the outpatient staff, eight specialists and twenty-eight interns. In addition, more than forty members of the alumni association of the hospital have been commissioned and assigned to duty. One member of the board of trustees of the hospital is a major in the Quartermaster Corps, and one a major in the Engineer Corps, and two members are giving full time service to the American Red Cross. Also sixty-five nurses, including the associate superintendent and the night superintendent of the training school comprise the nursing staff of Base Hospital Unit No. 3, the Mount Sinai Hospital Unit, which is now in foreign service.

New York City

Conference on Hospital Social Service.—The New York conference on hospital and social service held a meeting at the Academy of Medicine, February 20. Dr. William Francis Honan spoke on "The Importance of Social Service in a Municipal Hospital," and Dr. James Alexander Miller made an address on "Social Conditions in France."

Health Department Extends Autonomy Plan.—The new health commissioner, Dr. J. Lewis Amster, has announced that hereafter in the boroughs of the Bronx and Queens, the assistant sanitary superintendent will be responsible for most of the administrative work of those boroughs. Dr. Arthur J. O'Leary has been made assistant sanitary superintendent of the Bronx and Dr. John L. R. Barry will continue in that office in Queens. This is in accordance with the present policy of bringing the health department close to the people and practically giving each borough autonomy in its own locality.

Prevention of Diseases in War Industries.—The meeting of the New York Academy of Medicine to be held, March 7, under the auspices of the public health committee is to be devoted to a discussion of the prevention of diseases in war industry, and the subject will be considered under the following heads:

1. Extent and Importance of the Problem, by Dr. David Linn Edsall, Professor of Clinical Medicine, Harvard University.
2. New Poisons in War Industries (illustrated by lantern slides), by Dr. W. Gilman Thompson, Emeritus Professor of Medicine, Cornell University Medical College, New York City.
3. Methods of Prevention and Control, by Dr. Joseph W. Schereschewsky, Director, U. S. Public Health Laboratory, Pittsburgh, Pa.
4. Aid from the Medical Profession, by Dr. Alfred Stengel, Professor of Medicine, University of Pennsylvania.

Personal.—Dr. Frank E. Wilson, Brooklyn, former congressman, recently underwent an operation at the Post Graduate Hospital, Manhattan, and is reported to be making satisfactory progress toward recovery.——Dr. Isidore H. Goldberger has been appointed special lecturer on child hygiene in the school for oral hygiene at Columbia University.——Dr. Sylvester R. Leahy, resident alienist in charge of the psychopathic ward in the Kings County Hospital, Brooklyn, for three and one-half years, has resigned to enter private practice.——Dr. Geza Kremer has been appointed medical superintendent, Dr. Julius Dworetzky, resident physician and acting deputy medical superintendent, and Dr. Maurice G. Milan, resident physician of Sea View Hospital and Sanatorium, West New Brighton.——Dr. Stanley L. Wang has resigned as resident physician of the Sea View Hospital and Sanatorium.

PENNSYLVANIA

Personal.—Dr. Samuel McC. Hamill, Philadelphia, has been appointed chief to the division of Babies' Welfare, a new bureau created in the state department of health.——Dr. George T. MacLeod, Ardmore, is under treatment at the Bryn Mawr Hospital for a fracture of the arm and other injuries from a fall.

Resolutions for Increased Rank and National Licensure.—At a recent meeting, the board of directors of the Allegheny County Medical Society passed resolutions requesting army authorities and legislators to support legislation giving increased rank to medical officers and to exempt all honorably retired medical men from state board examinations.

Philadelphia

Personal.—Dr. Charles H. McDevitt has been appointed assistant medical inspector to the bureau of health.——Dr. S. Lewis Ziegler, former director of health and charities, has been elected president of the Philadelphia Alumni Association of the University of Pennsylvania Medical School. The other officers elected were Drs. Henry J. Off, John J. Robrecht and William S. Wray, vice presidents; Dr. Herbert B. Carpenter, treasurer; Drs. Stephen E. Tracy and W. Oakley Hermance, secretaries.

SOUTH CAROLINA

District Society Meeting.—At the annual meeting of the First District Medical Association held in Walterboro, February 6, Dr. John B. Johnston was elected president, and Dr. Judy, secretary, both of St. George. The next meeting will be held in Beaufort in July.

Meningitis.—February 3, orders were issued by the public health department of Columbia closing the public schools, churches, motion picture theaters and other public gathering places in an effort to prevent the spread of meningitis. Fifteen cases were reported in the city and suburbs, one new case having occurred on the date mentioned. The order did not affect Camp Jackson.

The Listing of Delinquents.—At a recent meeting of the Medical Society of the State of South Carolina, a resolution was adopted setting forth that in view of the enormous increase in the cost of living and the fact that physicians have made no increase in their regular fees, each member of the society be requested to hand to the officials "the names of those persons of means, who have refused to pay their doctor bills, so that a list may be made."

Personal.—Lieut. James A. Hayne, Columbia, state health officer and secretary of the state board of health, has been ordered to report to Camp Joseph H. Johnston, Jacksonville, Fla., for active service. The boards of health of the city, county and state, as well as the house of representatives, have wired to the War Department requesting that this order be rescinded on account of Lieut. Hayne's important work. ——Dr. Edwin R. Wilson has been elected secretary of the Sumter County Tuberculosis Camp Commission.

TEXAS

Reciprocal Relations.—Official information received from the Texas State Board of Medical Examiners states that reciprocal relations have been established between Illinois and Texas.

Venereal Clinic Opens.—A clinic for the treatment of venereal diseases of men and women was opened last month at El Paso, in charge of Drs. John W. Tappan and B. V. Wood of the United States Public Health Service, Dr. Will Rogers, health officer of El Paso County, and Dr. Hugh S. White, health officer of El Paso.

Personal.—Fire in the office of Dr. John W. Kuykendall, Fort Worth, February 1, did damage to the extent of $700. ——Dr. Peter H. Scardino, Houston, has asked the city council for indefinite leave of absence that he may go to Italy with Loyola Unit No. 102 of New Orleans.——Dr. Thomas B. Fisher, Dallas, has been appointed a member of the state board of health, succeeding Dr. William D. Littler, Fort Worth, resigned.

VIRGINIA

Personal.—Dr. James W. Reed, Ocean View, has been elected health officer of Norfolk County, and Dr. George M. Converse of the United States Public Health Service, director of health for the county.

State Health Officer's Salary Increased.—By a vote of 58 to 50, the house of delegates of Virginia adopted the senate bill authorizing an increase in the salary of the state health officer from $3,500 to $5,000 a year.

Additions to Hospital.—The directors of the Protestant Hospital of Norfolk announce that in order to meet the growing needs of the institution, a new ward for colored patients is to be built and an addition is to be made to the nurses' home.

Hospital Unit to Mobilize.—The Medical College of Virginia Base Hospital Unit, organized at the Medical College of Virginia, has been ordered to mobilize immediately for training at Camp Lee. The unit is commanded by Major Stuart McGuire, Richmond; the chief of the surgical staff is Capt. William L. People, M. R. C.; the chief of the medical staff is Capt. J. Garnett Nelson, M. R. C., and the adjutant, Capt. James H. Smith, M. R., all of Richmond.

WISCONSIN

Personal.—Dr. Edward M. Hunt, Aniwa, has been appointed local surgeon to the Minneapolis, St. Paul and Sioux Ste. Marie Railway at Goodman.——Dr. Thaddeus D. Smith, Neenah, who was wounded in a German air raid over a base hospital in France and incapacitated for further military service, has returned home.——Dr. John P. Koehler has been appointed deputy health commissioner of Milwaukee.——Dr. William F. Whyte, Madison, has been reappointed a member of the state board of health.——Dr. John A. Froehlich, Princeton, has accepted an appointment to the staff of the Mayo Hospital, Rochester, Minn.——Dr. George C. Ruhland has been elected president, Drs. George A. Harlow and Philip P. Rogers have been made vice presidents, and Dr. John Van de Erve, Wauwatosa, has been elected secretary of the Milwaukee Social Hygiene Society.——Dr. Ladislaus L. Adamkiewicz, Milwaukee, assistant surgeon, U. S. Navy, who was rescued when the United State destroyer *Jacob Jones* was torpedoed, is now on the medical staff of a base hospital in Scotland.

CANADA

Standard for Flour.—On and after January 28, one barrel of flour must be made from 265 pounds of wheat, the amount of grain formerly used being 300 pounds. There is now only one standard of flour, which is made from a 74 per cent. abstraction. This, it is expected, will save 35 pounds of flour in each 300.

Standardizing Medical Board.—Lieut.-Col. Harry H. Alger, Stirling, Ont., who went overseas as medical officer of the Eightieth Battalion, after several months' service at the front, has been sent to a base hospital for instruction, and will go from there to England to standardize the medical board work, beginning at the base and carrying on the work through England, and thence to Canada.

Personal.—Major George R. Cruickshank, head of the standing military medical board at Windsor, Ont., has, at his own request, been retired from active participation in military affairs.——Former Comptroller Dr. Robert W. Shaw, London, Ont., has been appointed a commissioner of the London Railway Commission.——Dr. Walter S. Downham, London, Ont., has been appointed a medical sanitary inspector of that city.——Col. Adam T. Shillington, Ottawa, has returned from overseas.——Capt. David E. Staunton Wishart, Toronto, on duty with the British army in Palestine, son of Dr. David J. Gibbs Wishart, was recently mentioned, in despatches by General Allenby, for gallant conduct and distinguished service.——Capt. Albert E. Sutton, Bethany, Ont.,

who was awarded the military cross recently for distinguished services, is in Toronto.

Canadian Military Hospital Commission.—The Dominion government has created a new department under a responsible minister of the crown. Senator Sir James Lougheed, who has been head of the Military Hospitals Commission since its inception, will be in charge of the new department and will have full cabinet rank. The name of the department is to be the Soldiers Civil Reestablishment Department. The Military Hospitals Commission with its staff is to be continued under the name of the Invalided Soldiers Commission. The new department and the Invalided Soldiers Commission will work in close cooperation with the various provincial governments. The medical end of the work is to be under the control of the Canadian Army Medical Corps.

Montreal Board of Health.—As the civic government of Montreal for some time past has not shown efficient results, a municipal survey of the various departments has recently been made by an expert. Dealing with the board of health, the report states that that body, as at present constituted, is performing no function of value. The board has met only five times since 1911. It, therefore, did not meet the needs of a board of health, as it acted in an advisory capacity to the medical officer of health. The report goes on to recommend that the present board of health be eliminated and the by-law creating it be annulled. It commends the efficiency of the present medical officer of health, Dr. Seraphin Boucher. It recommends that he be permitted to select his own board of health from among those interested in public health work, and that such board act in an advisory capacity to him. Another important recommendation calls for the appointment of an assistant medical officer of health. The remainder of the report deals with the internal administration of the health department.

GENERAL

Bequests and Donations.—The following bequests and donations have recently been announced:

United Hospital Fund of New York City, $31,331, from the bankers and brokers' auxiliary.

Samaritan Hospital, Philadelphia, $1,000 by the will of William G. Ellis.

Federation of Jewish Charities of Philadelphia, $3,000, ultimately, to be received from the estate of Raphael Golbacher.

Mount Sinai Hospital, Hebrew Orphan Home, Sanitarium, Hebrew Free Schools and three other nonmedical organizations, $1,000 each by the will of Jacob Uditski.

Quincy, Mass., City Hospital, $2,000 by the will of Dr. John A. Gordon, Quincy.

St. Vincent's Infant and Maternity Home, Chicago, $3,000; Little Sisters of the Poor, $2,500, and Guardian Angel German Catholic Orphan Asylum, Chicago; Home for Jewish Orphans, each $1,000, by the will of Martin T. Corby.

College of Physicians and Surgeons in the city of New York, a gift of $68,000 to provide for future medical students.

Banquet to Dr. Stephen Smith.—A banquet in honor of the ninety-fifth birthday of Dr. Stephen Smith, New York, the "Grand Old Man" of American medicine, was given at the Battle Creek (Mich.) Sanitarium, February 19. Dr. Smith gave a most interesting account of the changes he had witnessed in the methods of his profession. Other speakers were Dr. William A. Evans, Chicago, president of the American Public Health Association; Dr. Henry B. Baker, Ypsilanti, for many years secretary of the Michigan State Board of Health; Col. Cosam J. Bartlett, M. C., U. S. Army, and Major Ernest E. Irons, M. R. C., U. S. Army. About 100 medical officers from Camp Custer were present.

Meeting of Throat, Nose and Ear Specialists.—The midwinter annual meeting of the middle section of the American Laryngological, Rhinological and Otological Society was held at Indianapolis, February 22.

FOREIGN

Deaths in the Profession Abroad.—**R. Malatesta,** killed by aeroplane bomb while tending the wounded in a hospital raided by enemy aeroplanes, docent of surgical pathology at the University of Padua, aged 39.——The *Policlinico* mentions the death at Berlin from typhus of **A. Pappenheim,** editor of the *Folia haematologica.*——**L. Viviani,** killed by an air bomb while operating on a wounded soldier at Castelfranco, aged 40.——**E. De Ambris** of Padua, a criminologist.——**G. Gandolfi,** chief of the medical department of the army in the Genoa district.——**V. Fazzi,** member of parliament and surgeon at Lecce, Italy.

The Guatemala Earthquake.—Relief supplies valued at $110,000 purchased by the American Red Cross from government sources in the Canal Zone, have reached Guatemala City, January 19. Dr. Carlos F. Secord, for twenty years a medical missionary and physician in Guatemala, writes that the United States Marines reached Guatemala City a day after the second earthquake, January 3.

PARIS LETTER

PARIS, Jan. 31, 1918.

Death of Gaucher

Dr. Ernest Gaucher is dead at the age of 64 years. He was clinical professor of diseases of the skin and syphilis in the Paris Faculté de médecine, physician to the hospital Saint Louis, and physician in chief of the military hospital at Villemin. He was born at Chamfleury, studied medicine in Paris, and was a hospital intern in 1877; technician in histology in 1880; chief of the laboratory of the Charité in 1885; physician to the hospitals in 1886, and associate professor in 1892. In 1902 he was appointed professor of skin diseases and syphilis, succeeding Professor Fournier. Gaucher had been a member of the Academy of Medicine since 1910, was president of the Association générale de médecins de France, and presided over the section on medical sciences at the last congress of the French Association for the advancement of science, in 1908. Among his numerous works may be cited those on primary epithelioma of the spleen, the treatment of diphtheria, chronic intoxication by nitrogenous extractives, and the diatheses. His lectures on the diseases of the skin placed him among the notables in medicine, and helped to maintain the prestige of the French school of dermatology at the hospital Saint Louis. He published also the "Theory and Practice of Diseases of the Skin," 1885; "Epitome of Syphilography" and "Lectures on Diseases of the Skin," 1895. He was also a collaborator on the "Treatise of Medicine and Therapeutics" by Brouardel-Gilbert, and on the "Treatise on General Pathology" by Bouchard (Semeiology of the skin).

Etiology of Trench Fever

Drs. Couvy and Dujarric de la Rivière recently communicated to the Society of Biology the results of their researches on the etiology of trench fever. It is shown that the condition known as trench fever is a well established clinical entity, and that it is caused by a spirochete, presenting itself in two forms, a short form found in the blood, and a long form found in the organs of infected animals. The guinea-pig can be inoculated with the disease by injecting the blood of a patient. The blood should be withdrawn during a period of fever. The animal presents a temperature curve comparable with that of the human suffering from trench fever. In order to obtain the spirochetes, the guinea-pig should be killed at the height of the fever curve, for death occurs among these animals in only about one third of the cases. The pathogenicity and the immune reactions differentiate this spirochete from the spirochete of icterohemorrhagic fever.

Stretcher Bearers No Longer Attached to Combatant Units

The *Journal officiel* has published a decree to the effect that stretcher bearers are no longer attached to combatant units, but that they now are *unités sanitaires de première ligne,* that is, they have been transferred from the combatant to the medical department of the army. The members of the groups of stretcher bearers are and remain neutral according to the international conventions in vogue.

Reorganization of the Invalides

Following a visit made on January 1 to the Invalides, the premier, M. Clemenceau, has decided to reorganize the Invalides at once. This is the famous old soldiers' home, with the tomb of Napoleon, at Paris. After consultation with M. Justin Godart, under secretary of state for the army medical department, he submitted to the president of the Republic an outline for a decree which will soon be signed. The decree provides: I. The Invalides shall receive and treat within the limits of its budget permanently as pensioners members of all grades of the army and navy who cannot receive at home the attention and care they need. It will also receive temporarily discharged soldiers requiring intervention of a special nature. Also, provisionally, the helplessly crippled requiring further treatment and aid for the usual acts of life. II. The Invalides shall be in charge of the War Department, and will account to the under secretary of this department. It will be wholly independent of all other establishments, especially of the museum of the army. III. The establishment shall be subject to the rules laid down for military hospitals. It is

under the orders of a *médecin-chef*. The rights conferred on the director of service by the regulations of the Service de Santé are delegated to the director of the Service de Santé of the military government of Paris. IV. The establishment occupies at the Hôtel des Invalides the ensemble of the buildings ordinarily comprising the infirmary of the Invalides; if the necessity for extension arises, annexes can be organized outside of Paris.

Association News

THE CHICAGO SESSION

Advisory Committee on Scientific Exhibit

In order to secure desirable material from various sources for the Scientific Exhibit at the coming meeting, an Advisory Committee on Scientific Exhibit has been appointed consisting of Dr. Harlow Brooks, New York; Dr. A. S. Warthin, Ann Arbor, Mich.; Dr. George L. Dock, St. Louis; Dr. L. B. Wilson, Rochester, Minn.; Dr. E. R. LeCount, Chicago; Dr. Oskar Klotz, Pittsburgh; Dr. F. P. Gay, Berkeley, Calif.; Dr. C. C. Bass, New Orleans; Dr. W. M. L. Coplin, Philadelphia; Dr. Joseph C. Bloodgood, Baltimore, and Dr. Walter B. Cannon, Boston.

The Scientific Exhibit will occupy the mezzanine of the Hotel Sherman. This will also be the general headquarters of the Chicago Session. The available space seems ample but in order to arrange the space to the best advantage it is desirable that the Director of the Scientific Exhibit know early what to expect. Applications should be made at once. Assignment of space will be made Tuesday, April 2, 1918, and all applications must be received before that date.

Those desiring to exhibit work may secure application blanks and further details by addressing Dr. George H. Weaver, Director of Scientific Exhibit, 637 South Wood Street, Chicago.

Marriages

LIEUT. LESTER JOERG PALMER, M. R. C., U. S. Army, Chicago, on duty at Camp Grant, Rockford, Ill., to Miss Mercedes Blackledge of Caney, Kan., at Rockford, February 3.

CAPT. EDWARD CHARLES LUDWIG, M. R. C., U. S. Army, on duty at Camp Hancock, Augusta, Ga., to Miss Elizabeth T. Goldsbury, both of Columbus, Ohio, February 4.

LIEUT. WALTER JULIUS MELLIES, M. R. C., U. S. Army, on duty at Camp Funston, Kan., to Miss Jeanette Alexander, both of St. Louis, at Manhattan, Kan., February 2.

PASSED ASST. SURG. SAMUEL WESTRAY BATTLE, Lieutenant, U. S. Navy (retired), to Mrs. Vinton Liddell, both of Asheville, N. C., in New York City, February 7.

ASST. SURG. GILBERT WILLIAM HAIGH, Lieutenant, U. S. N. R. F., on duty at Boston Navy Yard, to Miss Ruth Dana, both of Worcester, Mass., December 1.

LIEUT. IMAS PRYOR RICE, M. R. C., U. S. Army, on duty at Camp Grant, Rockford, Ill., to Miss Emma Edlund, both of Chicago, February 3.

FREDERICK WINDEL CHAPIN, M.D., New York City and Wilton, Conn., to Miss Ellen Childe Emerson of Pittsfield, Mass., February 14.

LIEUT. LEROY HENRY SMITH, M. R. C., U. S. Army, to Miss Frances M. Lougee, both of Winterport, Me., at Shortville, N. Y., February 12.

LIEUT. IRL EDWIN HEMPSTID, M. R. C., U. S. Army, Burrton, Kan., to Miss Margaret Stewart of Hutchinson, Kan., January 2.

JAMES WOOD JORDAN, M.D., Ashland, Va., to Miss Christine Churchill Cooke of Richmond, Va., February 9.

EARL R. LEONARD, M.D., Benkelmen, Neb., to Miss Thelma L. Nicholl of Auburn, Neb., February 6.

SAMUEL H. HELLER, M.D., Lancaster, Pa., to Miss Pauline G. Gilbert of Philadelphia, recently.

ARTHUR ELLIS SCHILLER, M.D., Detroit, to Miss Rena Raffman of Chicago, February 19.

Deaths

Samuel Gibson Dixon, M.D., president of the Medical Society of the State of Pennsylvania, and commissioner of the state department of health; aged 66; died in the University of Pennsylvania Hospital, February 26, from anemia. Dr. Dixon, who was descended from a long line of Quaker ancestors, was born in Philadelphia, March 23, 1851. He studied law and was admitted to the bar in 1877, and was given the degree of M.D., with honors, by the University of Pennsylvania in 1886. Two years later he was made professor of hygiene, and a year thereafter professor of sanitary engineering and dean of the auxiliary department of medicine in his alma mater. Dr. Dixon was always a research worker, and made special fame in the department of bacteriology. He was the first to describe, in 1886, the branched form of the tubercle bacillus, and preceded Koch by six months, in the production of immunity to the tubercle bacillus. In 1890, Dr. Dixon became professor of bacteriology and microscopic technology in the Philadelphia Academy of Sciences, was made curator in 1891, and has been executive curator since 1892 and president of the organization since 1896. He was a member of the board of public education of Philadelphia from 1888 to 1894, and during this time was chairman of the committee of hygiene. He was also a trustee of the University of Pennsylvania, first vice president of the Ludwick Institute, vice president of the Zoological Society of Philadelphia; a member of the board of managers of the Grandom Institution; a Fellow of the American Medical Association; and for many years was a member, in 1916 elected president of the Medical Society of the State of Pennsylvania and inducted into office in 1917.

Dr. Dixon was a prolific writer on bacteriologic and hygienic subjects. To his work as commissioner of health for the commonwealth of Pennsylvania he brought splendid equipment, ideal foundation training and admirable executive ability. Among the notable achievements of the department of health since Dr. Dixon assumed charge are the collection of complete birth records; the collection of full data regarding deaths; the compilation of morbidity statistics; the filing classification of all vital statistics; the working out of the details of rural quarantine; the sanitary inspection of dairies; the evolution of a system of inspection of pupils in the public schools, both interurban and rural; the organization of a state laboratory; the organization of a division of sanitary engineering; the establishment of three large tuberculosis sanatoriums, and a state-wide system of dispensaries for tuberculosis, and a successful propaganda of educational publicity. In the accomplishment of all these results, Dr. Dixon was always the leader and director. He had been ill for many months, but whether in hospital in Philadelphia, or in the State Sanatorium, controlled the sanitary administration of the state.

Dr. Dixon was a sanitarian of distinguished ability and efficiency and as an administrative officer was unsurpassed. The reduction in mortality and morbidity in the state during Dr. Dixon's administration will be his lasting monument.

Major Charles Smith Turnbull, M.D., M. C., N. G. Pa., Philadelphia; University of Pennsylvania, Philadelphia, 1871; aged 70; a Fellow of the American Medical Association and American Academy of Medicine, and a member of the Association of Military Surgeons of the United States; a specialist on diseases of the eye; a member of the teaching staff of the New York Ophthalmic and Aural Institute for two years, and of Jefferson Medical College for eight years; chief of the aural department of Jefferson Medical College for ten years; oculist and aurist to the German Hospital, Philadelphia, for more than thirty-five years; to the Odd Fellows' Home, to the Pennsylvania Institute for the Deaf and Dumb, and to the Home for Teaching Deaf Children to Speak; ophthalmic and aural surgeon to the Jewish, Howard and St. Christopher's hospitals, and to the Home for Incurables, Philadelphia; a prolific contributor to the literature of his specialty; major surgeon of the First Infantry, N. G., Pa., since 1900; brigade surgeon during the "Pittsburgh and Round House Campaign"; died at his home, February 21.

Thomas Jefferson Mays, M.D., Philadelphia; Jefferson Medical College, 1868; aged 72; a Fellow of the American Medical Association; a member of the American Climatological Association, American Neurological Association and Philadelphia College of Physicians; a specialist on diseases of the heart and lungs, with special reference to tuberculosis; from 1888 to 1902 professor of diseases of the chest in the

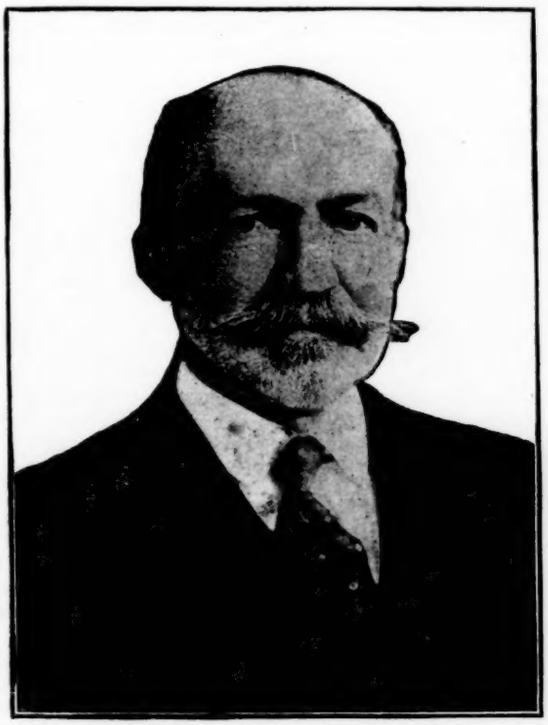
Philadelphia Polyclinic Hospital; one of the organizers of Rush Hospital for Consumption in 1890, and visiting physician to the institution until 1905; organizer of the Philadelphia Clinic for Home Treatment of Consumption, and director thereof until his death; died at his home, February 14, from cerebral hemorrhage.

Robert Lee Payne, M.D., Norfolk, Va.; Jefferson Medical College, 1881; aged 60; formerly president of the Medical Society of the State of North Carolina, and president of the Seaboard Medical Association in 1907; superintendent of health of Davidson County, N. C., for ten years; surgeon to the Southern Railway and Chesapeake and Clyde Steamship Company; chief surgeon of the Norfolk Southern Railroad; director and medical director of the Jamestown Exposition Company; gynecologist to St. Vincent's Hospital, Norfolk; a director of the Norfolk National Bank; died in a hotel in Durham, N. C., February 8, from heart disease.

Thomas Coke Biddle, M.D., Topeka, Kan.; Rush Medical College, 1881; aged 60; a member of the Kansas Medical Society; clinical professor of mental diseases in Kansas Medical College, Topeka; from 1895 to 1898 superintendent of the Osawatomie State Hospital; superintendent of the Topeka State Hospital for nineteen years; surgeon of the Twenty-First Kansas Volunteer Infantry during the war with Spain, with service in Porto Rico; died at his home in the Topeka State Hospital, February 16, from pneumonia.

Oscar G. B. McMullan, M.D., Elizabeth City, N. C.; University of Virginia, Charlottesville, 1880; aged 61; a Fellow of the American Medical Association; organizer in 1885 of the Elizabeth City Cotton Mills and president for five years; organizer in 1889 and since president of the Citizens' Bank, Elizabeth City; director of the Elizabeth City and Norfolk Telephone and Telegraph Company; died at his home, February 13, from pneumonia.

Capt. Odos Arville Hopkins, M.D., M. R. C., U. S. Army, Middlefield, Ohio; Kentucky School of Medicine, Louisville, 1893; Medical College of Ohio, Cincinnati, 1895; aged 46; a Fellow of the American Medical Association; on duty at Camp Beauregard, La., with the One Hundred and Fifty-Fifth Ambulance Corps, One Hundred and Fourteenth Sanitary Train; died in Camp Beauregard, January 15, from spinal meningitis.



SAMUEL GIBSON DIXON, M.D., 1851-1918

Francis Moore Clarke, M.D., Middletown, N. C.; College of Physicians and Surgeons, Baltimore, 1893; aged 47; a Fellow of the American Medical Association; formerly acting assistant surgeon, U. S. P. H. S., at Beaufort, N. C., and superintendent of health of Carteret County; died in a hospital in Washington, N. C., February 3, from intestinal obstruction following an operation to relieve intestinal obstruction.

George Bradfoot Lawrason, M.D., Shreveport, La.; Tulane University, New Orleans, 1883; aged 63; a Fellow of the American Medical Association; formerly contract surgeon, U. S. Army, and later surgeon of volunteers during the war with Spain, with service in the Philippine Islands; coroner of Orleans Parish from 1893 to 1896; died in the Touro Infirmary, New Orleans, February 3, after a surgical operation.

Captain Frank Shumway Pratt, M.D., M. R. C., U. S. Army, North Ben, Ore.; University of Oregon, Portland, 1908; aged 51; formerly county physician and health officer of Skamania County, Wash., and health officer of Stevenson; local surgeon of the Spokane, Portland and Seattle Railway Company; on duty at Fort D. A. Russell, Wyo.; died at that post, February 12.

John Jay Marvin, M.D., Cincinnati; Pulte Medical College, Cincinnati, 1874; aged 83; formerly demonstrator of anatomy in his alma mater; twice mayor of the village of Pleasant Ridge, and founder of the Pleasant Ridge Library; died at the home of his son in that place, February 5, from the effects of a fracture of the ribs.

Howard Burhans Besemer, M.D., Ithaca, N. Y.; New York University, New York, 1891; Cleveland Homeopathic Medical College, 1892; aged 48; a Fellow of the American Medical Association; and once president of the Tompkins County Medical Society; health commissioner of Ithaca for eight years; died at his home, February 8, from acute gastritis.

Ambrose John Gallison, M.D., Franklin, Mass.; Dartmouth Medical School, Hanover, N. H., 1888; aged 61; a Fellow of the American Medical Association; once president and orator, and for fifteen years secretary of the Thurber Medical Association of Milford, Mass.; died at his home, February 13, from heart disease.

Lindus LaRell Riggs, M.D., Maquoketa, Iowa; Keokuk Medical College, College of Physicians and Surgeons, 1904; Jefferson Medical College, 1905; aged 49; a Fellow of the American Medical Association; died at his home, February 7, from heart disease.

George Jacob Smith, M.D., Niles Ohio; University of Pittsburgh, 1899; aged 42; a Fellow of the American Medical Association; while driving his automobile over a grade crossing at Niles, February 5, was struck by an Erie train, and instantly killed.

Lieut. Henry Edward Hungerford, M.D., M. R. C., U. S. Army, Waterbury, Conn.; Yale University, New Haven, Conn., 1898; aged 45; a Fellow of the American Medical Association; died at Camp Greenleaf, Fort Oglethorpe, Ga., February 1, from acute dilatation of the heart.

Edwin Robinson Dean, M.D., South Bend, Ind.; Jefferson Medical College, 1890; aged 52; a member of the Indiana State Medical Association; medical director of the Conservative Life Insurance Company; died at his home, February 2, from heart disease.

William Webster Ensey, M.D., Dayton, Ohio; New York Homeopathic Medical College, New York, 1892; aged 48; a member of the staff of the Miami Valley Hospital, Dayton; died in that institution, February 4, a few hours after a surgical operation.

Olive B. Metcalf, M.D., Oakland, Calif.; California Medical College, Eclectic, San Francisco, 1883; aged 100; died at the home of her adopted daughter in Oakland, February 18.

Rufus A. DuMars, M.D., Peoria, Ill.; Louisville Medical College, 1876; University of Pennsylvania, Philadelphia, 1877; aged 68; a member of the Illinois State Medical Society; died in St. Francis' Hospital, Peoria, February 1, from cholelithiasis.

Joseph B. Sappington, M.D., Austin, Texas; University of Nashville, Tenn., 1860; aged 78; formerly a member of the State Medical Association of Texas; surgeon in the Confederate Army during the Civil War; died at his home, January 27.

Theodore Jacobs, M.D., Morristown, Pa.; University of Pennsylvania, Philadelphia, 1860; aged 82; surgeon in the U. S. Navy during the Civil War, and on duty with the gunboat fleet on the Mississippi; died at his home, February 7.

William Parish Wentworth, M.D., Pittsfield, Mass.; New York Homeopathic Medical College, New York, 1886; aged 57; at one time a member of the faculty of his alma mater; died in the Homeopathic Hospital, Boston, February 1.

Joseph Raoul Pepin, M.D., Manchester, N. H.; Laval University, Montreal and Quebec, 1895; aged 45; a member of the Arctic Expedition commanded by Capt. Bernier of Canada in 1896; died at his home, January 31.

Foster Bradley Crutcher, M.D., San Antonio Texas; Vanderbilt University, Nashville, Tenn., 1887; aged 57; formerly a member of the Tennessee State Medical Association; died at his home, Nov. 25, 1917, from septicemia.

Devotie Dennis Jones, M.D., Birmingham, Ala.; University of Maryland, Baltimore, 1872; aged 73; a member of the Medical Association of the State of Alabama; died at his home, Dec. 23, 1917, from pleuropneumonia.

Daniel Karsner, M.D., Philadelphia; Jefferson Medical College, 1865; Hahnemann Medical College, 1887; aged 86; assistant surgeon of United States Volunteers during the Civil War; died at his home, February 8.

William M. Scott, M.D., Centerville, Iowa; College of Physicians and Surgeons, Keokuk, Iowa, 1871; aged 77; surgeon of the Thirty-Third Iowa Volunteer Infantry during the Civil War; died at his home, February 2.

Willis Hamilton, M.D., Richmond, Mo.; Jefferson Medical College, 1889; aged 87; a pioneer practitioner of Missouri; died, February 1, in a hospital in St. Joseph, Mo., following a fall in which he fractured his right hip.

Clarence A. Hastings, M.D., Malone, N. Y.; University of Vermont, Burlington, 1889; aged 55; a member of the Medical Society of the State of New York; died at his home, Dec. 23, 1917, from cerebral hemorrhage.

Homer Warren Thompson, M.D., Salem, Ohio; Pulte Medical College, Cincinnati, 1885; aged 58; a specialist on diseases of the eye; and a well-known aeronaut; died at his home, February 8, from angina pectoris.

Silas H. Van Doren, M.D., Chicago; Bennett College of Eclectic Medicine and Surgery, Chicago, 1878; aged 66; for many years a practitioner of Elgin, Ill.; died at his home, February 8, from cerebral hemorrhage.

Thomas Henry Northridge, M.D., Brooklyn, N. Y.; Long Island College Hospital, Brooklyn, 1876; aged 67; a member of the Medical Society of the State of New York; died at his home, February 10, from pneumonia.

William Chauncey Carter, M.D., Fredericksburg, Va.; Medical College of Virginia, Richmond, 1878; aged 79; a Confederate veteran; died in the Mary Washington Hospital, Fredericksburg, Va., January 29.

Frank Post Butler, M.D., Whitten, Iowa; State University of Iowa, Iowa City, 1887; aged 56; a Fellow of the American Medical Association; died in a hospital at Marshalltown, Iowa, about February 2.

Edwin DeWitt Peugh, M.D., Brookfield, Mo.; Kansas City, Mo., Medical College, 1895; aged 44; a member of the Missouri State Medical Association; died at his home, February 2.

George W. Crosby, M.D., Atlantic City, N. J.; New York Homeopathic Medical College, New York City, 1878; aged 66; died at his home, February 4, from pneumonia.

William T. Irvine, M.D., Jonesville, Ind.; Central College of Physicians and Surgeons, Indianapolis, 1901; aged 62; died in his home, February 5, from septicemia.

Zachariah Raphael Morgan, M.D., Mechanicsville, Md.; Georgetown University, Washington, D. C., 1880; aged 72; died at his home, February 5.

Robert A. Childers, M.D., Floydada, Texas; Vanderbilt University, Nashville, Tenn., 1899; aged 40; died in Albuquerque, N. M., February 3.

John W. Johnson, M.D., Winchester, Ky.; University of Louisville, Ky., 1861; aged 87; died at his home, February 3, from cerebral hemorrhage.

Frederick Charles Roth, M.D., College of Physicians and Surgeons in the City of New York, 1891; aged 49; died at his home, February 3.

Susan Ema Pullin, M.D., Los Angeles; University of Michigan, Homeopathic Medical School, 1894; died at her home, about February 2.

William Henry Hamilton, M.D., Fort William, Ont.; Trinity Medical College, Toronto, 1884; died in Florida, February 3.

A. Byron Tapscott, M.D., Carlisle, Ark.; Missouri Medical College, 1878; aged 51; died at his home, January 30, from uremia.

William A. Seeley, Oelwein, Iowa (license, years of practice, Iowa, 1886); aged 70; died at his home, about February 3.

George Rodier, Natick, R. I. (license, Rhode Island, 1900); aged 43; died at his home, January 29.

The Propaganda for Reform

IN THIS DEPARTMENT APPEAR REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY AND OF THE ASSOCIATION LABORATORY, TOGETHER WITH OTHER MATTER TENDING TO AID INTELLIGENT PRESCRIBING AND TO OPPOSE MEDICAL FRAUD ON THE PUBLIC AND ON THE PROFESSION

NOSTRUMS IN RETROSPECT

A Review of Worthless or Unscientific Proprietary Mixtures Previously Critized

[FOREWORD.—The article that follows is the seventh[1] of a series written for the purpose of reviewing the findings of the Council on Pharmacy and Chemistry on certain unscientific or worthless proprietary mixtures. Although the preparations taken up in this series have been extensively dealt with in previous reports, the fact that they are still widely advertised and prescribed indicates the need of further publicity. The series is written by a man who is thoroughly conversant with the work of the Council on Pharmacy and Chemistry and can speak authoritatively on questions dealing with the actions of drugs in the treatment of disease.]

[ARTICLE VII]

SHOTGUN NOSTRUMS

By S. Q. Lapius, M.D.

Formerly it was customary to prescribe mixtures of many drugs on the assumption that if one of the ingredients missed the mark another might be expected to hit it, just as a poor marksman is more likely to hit a target at short range with a blunderbuss than with a high powered rifle. Increased precision in every branch of science has become the outstanding feature of civilization. The soldier today must shoot straight with a rifle that sends a single ball. There is none of the disposition to rely on chance as when the blunderbuss was used. A capable physician directs his drug straight at the seat of the trouble, and we now have many drugs that can be depended on to exert definite actions. The complex mixture is just as preposterous in modern therapeutics as the blunderbuss would be on a modern battlefield.

Every drug exerts undesired side actions, and it is the aim of the modern physician to try to select the one which will have a maximum of therapeutic with a minimum of undesired actions. When a complex mixture is employed it is obvious that only the best is utilized whereas all the undesired side actions come into play. We do not pretend that even the best studied drug has not much to be learned about it, but the nostrum maker who exploits a complex mixture either knows practically nothing of the side actions that it will exert or, if he knows, he conceals that knowledge. He knows that massive doses of hydrated chloral combined with various narcotics can be relied on to cause unconsciousness in nearly all cases, but he prefers to speak of this as a hypnotic action. This is plain gambling with human life. When the patient dies it is difficult to prove that death was caused by the mixture alone.

The Council on Pharmacy and Chemistry has expended a great deal of time and energy in combating the "shotgun" nostrum evil. It is easy to understand the disadvantages of such mixtures but it is not so easy to demonstrate the misleading character of the claims made, with an entire disregard of the truth, for these mixtures. No one believes that a pot of gold lies at the end of the rainbow, but no one has actually gone there to see for himself.

BROMIDIA

There are many types of "shotgun" nostrum. Some are dangerous, as in the case of "Bromidia"; some are preposterous, therapeutic monstrosities which excite the contempt

1. The previous articles of the series are "Bell-ans," THE JOURNAL, Nov. 24, 1917; "Anasarcin and Anedemin," Dec. 8, 1917; "Pepto-Mangan," Dec. 29, 1917; "Cactina Pillets," Jan. 19, 1918; "Ammonol and Phenalgin," Feb. 2, 1918; "Fellows' Syrup and Other Preparations of the Hypophosphites," Feb. 16, 1918.

of educated physicians, as in the case of "Tongaline"; some are merely useless mixtures of well known drugs, sold under grotesquely exaggerated claims, as in the case of "Peacock's Bromides."

Various formulas have been given for Bromidia. The manufacturers appear to be more cautious under those circumstances where falsehood might lead them into collision with the federal authorities, than when giving reign to fancy and considering only the best means of winning the favor of the physician. It is said to consist of hydrated chloral, potassium bromid, Indian cannabis, and hyoscyamus. It is impossible to determine from the published formulas just how much hydrated chloral and potassium bromid it contains, but it is probable that there are about fifteen grains of each of these two drugs to the fluid drachm, and variable amounts of Indian cannabis and a small amount of either extract or tincture of hyoscyamus.

This much is certain: Bromidia is a distinctly dangerous mixture for indiscriminate use. The claim of the manufacturers, implied, rather than directly stated, that it is superior to an extemporaneously prepared mixture of those drugs is especially reprehensible because it tends to create the impression that the nostrum is safer in effective doses, conducing to a false sense of security on the part of those who are deluded into prescribing it in larger doses than they would a mixture of the same drugs prepared extemporaneously.

A report of the Council on Pharmacy and Chemistry published in THE JOURNAL, May 16, 1914, mentions three instances in which death is reported to have followed the use of Bromidia. The manufacturers of Bromidia have no magic power to render hydrated chloral harmless while retaining its hypnotic action. It depresses the central nervous system, and it is nothing less than monstrous for any one to pretend to rob this drug of its dangerous properties while retaining its hypnotic effects. If the patient requires a hypnotic, the physician should choose that one which his judgment and experience dictate as the best for that particular patient. If he needs hydrated chloral, the physician should prescribe exactly as much as he believes the patient needs. If the effect is slightly greater or slightly less than anticipated, no harm is done and the physician has gained experience that will be valuable in future prescribing. If Bromidia is prescribed and unexpected effects are induced it is impossible to know whether these were due to the hydrated chloral or to one of the other narcotics or to a synergistic action, and there is nothing to guide in the further use of the nostrum, for mixtures of narcotics commonly have much less uniformity of action than a single drug.

The irritant action of hydrated chloral on the stomach can be avoided by the use of bland fluids or dilute solutions. The following serves as an example of the way in which it may be prescribed conveniently:

Hydrated chloral	grs. xl	2.6 gms.
Syrup of orange peel		
Water, of each	fl.℥ j	30.0 c.c.

A tablespoonful (15.0 c.c.) of this mixture, containing 10 grains (0.65 gm.) of hydrated chloral, will often induce sleep in the absence of severe pain or serious disturbance, and seldom does this dose have to be repeated more than once in such simple cases. Hydrated chloral is often used in somewhat smaller doses in combination with potassium bromid, which may be prescribed in a mixture such as the following:

Hydrated chloral	grs. xx	1.3 gms.
Potassium bromid	grs. lx	3.9 gms.
Syrup of orange peel		
Water, of each	fl.℥ j	30.0 c.c.

In producing sleep when severe pain is absent this is as effective as the preceding, in similar doses. The use of repeated doses of hydrated chloral either in such a mixture as this, or in the form of Bromidia or other nostrum when sleeplessness is due to severe pain is highly dangerous. It should be remembered that while hydrated chloral is an effective hypnotic in case of simple sleeplessness, it is not actively analgesic except in distinctly dangerous doses. Bromidia in repeated doses will induce sleep even in the presence of pain, of course, but any active narcotic does that, and it is correspondingly dangerous. Small doses of morphin given alone are preferable when sleeplessness is due to severe pain.

TONGALINE

"Tongaline" is an example of the type of "shot-gun" nostrum that would be merely ludicrous if we could look on anything that degrades therapeutics so lightly. A report was made to the Council on Pharmacy and Chemistry, and published in THE JOURNAL, July 17, 1915, p. 269, and in this report it is stated that Tongaline is said to consist of tonga, cimicifuga racemosa, sodium salicylate, colchicum, and pilocarpin. Whether the formula was cut short just there because the office boy ran out of breath at that point, or because the discoverers of this wonderful combination had not heard of the eminently potent substances that the witches added to their cauldron, we can leave to the reader's imagination, for it is manifestly impossible to present an orderly discussion of the pharmacology and therapeutics of such a preposterous jumble of drugs.

PEACOCK'S BROMIDES

"Peacock's Bromides" belongs to a slightly different class. It is said to consist of the bromids of sodium, potassium, ammonium, calcium and lithium. In the absence of a logical explanation of the pretended superiority of this mixture over one that is made extemporaneously the exploiters seem to have been driven to the necessity of pretending that its freedom from contaminating chlorids explains its claimed advantages over mixtures of the official or commercial bromids. The truth is that the chlorids are used as antidotes in bromid poisoning.

Disregard the claims made for Peacock's Bromides, and ask yourself the question whether you have ever actually seen any ill results following the use of the official bromids that you could reasonably attribute to contaminating chlorids. Furthermore, carefully consider the relative advantage of a single bromid (say the bromid of potassium, or bromid of sodium, if you prefer it), with the opportunity of observing its effects and adjusting the dose in accordance with the results of your experience, and a mixture such as Peacock's Bromides, the composition of which you do not know, and which the manufacturer can alter to suit his own convenience.

While it is true that the therapeutic art will not degenerate in its entirety merely because some physicians continue to use even the most fraudulent and worthless nostrums, yet, on the other hand, to the extent that a physician continues to be guided by the false teachings of nostrum venders who have no therapeutic training, he is plunged into therapeutic chaos.

Correspondence

THE CRITERIA OF THE WASSERMANN REACTION

To the Editor:—In my opinion, based on the study of syphilis from the histologic, bacteriologic and clinical points of view, the postmortem appearances, interpreted as being evidence of syphilis are the least valuable as proof and often actually misleading, contrary to the view expressed by Symmers and Darlington (Symmers, Douglaas, and Darlington, C. G.: The Value of the Wassermann Reaction, THE JOURNAL, Feb. 2, 1918, p. 279).

Syphilis is an anatomic disease, but the postmortem anatomic changes are often better regarded as the results of a disease, of a process which has come to an end before the death of the individual, rather than as the disease itself; hence the fallacy of correlating the results of a reaction, which necessarily depends on the active disease process, with terminal fibroid changes.

The Wassermann reaction presupposes that there are certain substances in one or both of two body fluids, the presence of which is determinable by that procedure.

A patient may have syphilis; but if the so-called Wassermann bodies are not present in the blood serum or spinal

fluid, the result will be negative. This may occur in cases of chancre before the end of the fourth week. Here the diagnosis is determined, first by finding the spirochetes by means of the dark field microscope or by one of the staining methods. We have had good results, first, with Wright's blood stain modified for spirochetes, as directed by Mallory and Wright; secondly, by making the Wassermann test after the fourth week, and thirdly, by the results of internal treatment.

I believe it is considered very harmful to wait as was formerly advised until the patient exhibited secondaries—a syphilitic septicemia which may implant the disease in every organ and tissue.

A vastly different and more reliable picture is presented by clinical syphilis than is presented by the postmortem appearance, and it is the correlation of the Wassermann test with this evidence that determines its usefulness.

A statement that the Wassermann reaction is found positive in a certain percentage of cases of syphilis is always of small value and often misleading. Instead of this too general statement the percentage of positive results in different phases of the development of the disease, depending on the presence of the specific bodies in the serum and spinal fluid, should be given.

Since 1912, at the St. Joseph's Hospital Laboratory we have been using a syphilitic liver antigen of uniform strength and reliability. We have had no use for any other. The cholesterinized antigen is admitted to give a small percentage of positive results in nonsyphilitic persons. Whatever questionable degree of sensitiveness this antigen affords is offset by this fallacy. We have never been convinced of the necessity of detecting the extremely minute positives, as it is the rule for patients to keep under observation and report for tests at lengthening intervals, so that a recurring positive would sufficiently soon be discovered.

Working with the aforesaid antigen and using one unit of complement instead of two, we have obtained the following results:

After the fourth week of the chancre, the Wassermann test was positive in practically 100 per cent. of the cases, excepting when influenced by proper treatment until the systemic end of the disease.

If secondary systemic syphilis with the blood serum charged with the specific bodies does not give 100 per cent. positives, there is something obviously wrong with the technic.

In the so-called tertiary lesions, the reaction will vary in strength of positiveness, agreeing with the discharge into the blood of the reaction-provoking substances.

Lesions such as aortic insufficiency give about 75 per cent. of positive reactions. Some patients with this affection who give negative reactions have, no doubt, been syphilitic; but the infection has been overcome, and the structural changes alone remain.

In cerebrospinal syphilis, the blood reaction is often negative because the infection there has been overcome; but the comparatively isolated cerebrospinal system is still infected, and the cerebrospinal fluid is positive. When the general infection has been overcome in the cerebrospinal axis, the spinal fluid is, of course, negative to the Wassermann test, but the patient may still have great impairment of his nervous system owing to the fibrosis of these tissues, the result of the conquered infection. Indeed, when this condition obtains—negative blood and negative spinal fluid in terminal syphilis—very little hope can be entertained of any improvement by specific treatment.

The test should not give positive results in nonsyphilitic persons. Very occasionally one may read the test too fine, as it were, because of sustained confidence in the test, and report a weak positive in a nonsyphilitic; but one is soon brought to earth by some means or other, and the mistake is corrected by another test.

Clinical syphilis and the dark field microscope should establish the validity of the Wassermann test in known cases. The Wassermann test should establish the presence of syphilis in unknown cases, and the results of treatment should justify the Wassermann test.

JOSEPH A. MOORE, M.D., Philadelphia.

STAMMERING

To the Editor:—In January, 1916, you published a number of letters on speech defects—especially stammering. This final statement was made: "If any one can point out the reason why stammering is so largely confined to men and boys, few women or girls being so troubled, the cause would be discovered." I have found that when speaking in the lower tones I stammer, and that when using the upper registers of the voice I have no such difficulty. By following out this plan I have overcome a speech defect of some years' standing. I have not found it necessary to speak in louder tones or in monotones, as so often advised. As men and boys almost invariably use the lower tones of the voice, and women and girls the higher, may not this be the reason why the trouble is limited to males? The knowledge that by raising my voice I can speak without difficulty enables me now to speak in any tone, as the fear of stammering has disappeared. This psychologic effect seems to me quite important.

GEORGE L. KENNEDY, Minneapolis.

Queries and Minor Notes

ANONYMOUS COMMUNICATIONS and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted, on request.

THE PROCHOWNICK DIET

To the Editor:—Please give me either the reference in English or publish the Prochownick diet for contracted pelves.

E. L. CORNELL, M.D., Chicago.

ANSWER.—The Prochownick diet was described in Queries and Minor Notes, THE JOURNAL, Oct. 28, 1911, and March 22, 1913.

For patients threatened with dystocia on account of a contracted pelvis, excessive development of the fetus with normal pelvis or fat and weak abdominal walls, Prochownick (*Therapeutische Monatshefte*, 1901) proposed a diet for the last eight weeks of pregnancy which should decrease the size and weight of the child, while strengthening the mother. The essential features of the diet are the withholding of carbohydrates and fluids and the giving of sufficient amount of proteins. It is practically an antifat diet.

The following is the daily bill of fare:

Morning, one small cup of coffee without sugar; a small, thin piece of bread (three-quarters ounce).

Noon, all kinds of meat, fish without sauces, eggs, a little green vegetables, salad and cheese.

Evening, same as at noon, one medium piece of bread (1½ ounces) butter, eggs and meat.

If the patient is accustomed to the use of alcohol, a small bottle of red or white wine is allowed; or an equal quantity of water may be taken during the day.

Large quantities of liquids, soups, potatoes, desserts, sugar, etc., are forbidden.

Such a diet provides about 125 gm. of proteins, giving 100 gm. of fat, giving 900 calories, or in all about 1,800 calories a day.

Fat patients with weak muscles improve physically and mentally on this diet, and come to labor in a much improved condition. As to the effect on the child, Prochownick and his followers assert that it will weigh a pound less than it would in the absence of the diet. The fat of the new-born, which amounts to 1 or 2 pounds, is laid on during the last eight weeks of pregnancy; the diet prevents this fat deposit. The child looks wrinkled, the head sutures are larger, and the head molds much better in its passage through the obstetric canal.

STOKES-ADAMS DISEASE

To the Editor:—1. What is Stokes-Adams disease, its etiology and pathology? 2. Is the condition of the heart in the disease such that it might be overlooked in an examination of the patient? 3. I have tried to find this in the medical literature at hand, but most of my books do not have anything on the subject.

J. A. VALENTA, M.D., Lake City, Iowa.

ANSWER.—1. Stokes-Adams disease, or heart block, is the name applied to a combination of symptoms described by

Stokes in 1846 and previously observed by Adams in 1827. It is characterized by bradycardia and cerebral attacks, either syncope or pseudo-apoplectic, or convulsive attacks. In order to understand the pathology and the mechanism of the production of the Stokes-Adams syndrome, it is necessary to be thoroughly acquainted with the newer studies of the physiology and pathology of the heart and circulation as revealed by the newer instruments of precision, such as the polygraph, electrocardiograph, etc. It has been found by studying the pathology of Stokes-Adams disease, as well as by noting with instruments the contractions of different parts of the heart, that the bradycardia is really due to interruptions of the impulse passing from the auricle to the ventricle through the bundle of His, and it is generally believed that degeneration of the tissue in the bundle of His is the cause of Stokes-Adams disease. The auricles beat many times more often than the ventricles, and these contractions are not transmitted to the arterial system. On the other hand, cases have occurred in which no lesion of the heart could be found, although generally there is arterial sclerosis, especially of the coronary arteries and the arterial system of the brain. The previous history of the patient often discloses syphilis.

2. This condition in a patient might easily be overlooked if the examination did not include all of the various methods that may be applied to a study of heart disease.

3. The following literature may be consulted:

Lewis, Thomas: Mechanism of the Heartbeat, London, Shaw & Sons, 1911; New York, P. B. Hoeber & Co.; $7.
Lewis, Thomas: Clinical Disorders of the Heartbeat, $2.
Osborne, O. T.: Disturbances of the Heart, Chicago, American Medical Association, 75 cents.
Cabot, Richard C.: Differential Diagnosis, New York, William Wood & Co., 1915, $3.50.
Greene, Charles L.: Medical Diagnosis, Philadelphia, P. Blakiston's Son & Co., 1917, $10.

ACETYLSALICYLIC ACID (ASPIRIN)

To the Editor:—What injurious effect is to be feared from the administration of aspirin, either in too large a single dose or by too prolonged moderate dosage? What is the largest single medicinal dose considered safe, and is the American aspirin reliable?

EVAN O'NEILL KANE, M.D., Kane, Pa.

ANSWER.—In reference to untoward effects from acetylsalicylic acid (aspirin), it is stated in New and Nonofficial Remedies, 1917, p. 265: "The promiscuous use of acetylsalicylic acid (aspirin) by the laity, especially for the relief of headache, has frequently led to cases of rather severe poisoning, the chief symptoms being edema of the lips, tongue, eyelids, nose or of the entire face; also urticarial rashes, vertigo, nausea and sometimes cyanosis. Some persons are especially susceptible to acetylsalicylic acid and these symptoms are usually ascribed to an idiosyncrasy." The following is the dosage of acetylsalicylic acid given in New and Nonofficial Remedies: "From 0.3 to 1 gm. (5 to 15 grains), repeated once in three hours until symptoms of salicylism (ringing in the ears, etc.) are noted."

The following brands of acetylsalicylic acid (aspirin) have been found to comply with the standards of the Council on Pharmacy and Chemistry for acetylsalicylic acid, and were admitted to New and Nonofficial Remedies:

Acetylsalicylic Acid-M. C. W., Mallinckrodt Chemical Works, St. Louis.
Acetylsalicylic Acid-Merck, Merck & Co., New York.
Acetylsalicylic Acid-Milliken, John T. Milliken & Co., St. Louis.
Acetylsalicylic Acid-Monsanto, Monsanto Chemical Works, St. Louis.
Acetylsalicylic Acid-P. W. R., Powers-Weightman-Rosengarten Company, Philadelphia.
Acetylsalicylic Acid-Squibb, E. R. Squibb & Sons, New York.
Aspirin-L. and F., Lehn & Fink, New York.

PERMIT AND BOND FOR USING AND DISPENSING ALCOHOL

To the Editor:—I am in receipt of the enclosed communication, which I presume went to all physicians, and which I think is a carefully concealed misrepresentation of the facts intended to mislead physicians. In reading the attached, one is led to believe that no alcohol can be used by a physician in his office; but as I understand the law, he can use nonbeverage alcohol in his spirit lamp, etc., and is not required to take out this permit.

L. L. LYMAN, M.D., Springfield, Ohio.

ANSWER.—The enclosure is a circular letter from a surety company offering to execute a bond for physicians who might purchase and use alcohol under the regulations prescribed in the war revenue measure. A complete discussion of the subject appeared in Queries and Minor Notes, THE JOURNAL, Jan. 19, 1918, p. 186.

Medical Education and State Boards of Registration

COMING EXAMINATIONS

ALASKA: Juneau, March 5. Sec., Dr. L. P. Dawes.
COLORADO: Denver, April 2. Sec., Dr. David A. Strickler, 612 Empire Bldg., Denver.
CONNECTICUT: New Haven, March 12-13. Sec., Dr. Charles A. Tuttle, New Haven.
CONNECTICUT (H): New Haven, March 12. Sec., Dr. E. C. M. Hall, 82 Grand Ave., New Haven, Conn.
DISTRICT OF COLUMBIA: Washington, April 9-11. Sec., Dr. Edgar P. Copeland, The Rockingham, Washington.
IDAHO: Pocatello, April 2-3. Sec., Dr. Ray H. Fisher, Rigly.
ILLINOIS: Chicago, March 25-26. Mr. F. C. Dodds, Supt. of Registration, Springfield.
MAINE: Portland, March 12-13. Sec., Dr. Frank W. Searle, 776 Congress St., Portland.
MASSACHUSETTS: Boston, March 12-14. Sec., Dr. Walter P. Bowers, Room 501, No. 1 Beacon St., Boston.
MINNESOTA: Minneapolis, April 2-4. Sec., Dr. Thos. McDavitt, 741 Lowry Bldg., St. Paul.
MISSOURI: St. Louis, March 19-21. Sec., Dr. George H. Jones, Capitol Bldg., Jefferson City.
MONTANA: Helena, April 2. Sec., Dr. S. A. Cooney, 205 Power Bldg., Helena.
NEW MEXICO: Santa Fe, April 8. Sec., Dr. R. K. McClanahan, East Las Vegas.
OKLAHOMA: Oklahoma City, April 9-10. Sec., Dr. J. J. Williams, Weatherford.
RHODE ISLAND: Providence, April 4-5. Sec., Dr. B. U. Richards, State House, Providence.
UTAH: Salt Lake City, April 1-2. Sec., Dr. G. F. Harding, 407 Templeton Bldg., Salt Lake City.

Pennsylvania July Examination

Mr. Nathan C. Schaefer, secretary of the Pennsylvania Bureau of Medical Education and Licensure, reports the practical and written examination held at Philadelphia and Pittsburgh, July 10-12, 1917. The examination covered 5 subjects. An average of 75 per cent. was required to pass. Of the 182 candidates examined, 175 passed and 7 failed. The following colleges were represented:

College	Year Grad.	Total No. Licensed
PASSED		
Howard University	(1916)	1
Bennett Medical College	(1915)	1
Hahnemann M. Coll. and Hosp. of Chicago	(1915) 1; (1916)	1
College of P. and S., Baltimore	(1913) 1; (1915)	2
Eastern University	(1913)*	1
Johns Hopkins University	(1914) 1; (1915) 1; (1916)	3
Maryland Medical College	(1912)	1
University of Maryland	(1916)	2
Harvard University	(1911) 1; (1915) 1; (1916)	1
Fordham University	(1916)	1
Syracuse University	(1913)	1
University of Buffalo	(1916)	1
Leonard Medical School	(1903)	1
University of Cincinnati	(1916)	4
Western Reserve University	(1915)	1
Hahnemann Med. Coll. and Hosp. of Phila.	(1915) 1; (1916)	10
Jefferson Medical Coll. of Philadelphia	(1912) 1; (1914) 1; (1915) 9; (1916) 34	
Medico-Chirurgical College of Philadelphia	(1914) 1; (1915) 9; (1916) 28.	
Temple University	(1914) 1; (1916) 8; (1917)	1
University of Pennsylvania	(1913) 1; (1915) 3; (1916)	10
University of Pittsburgh	(1916)	20
Woman's Medical College of Pennsylvania	(1915) 2; (1916)	5
University of Vermont	(1907) 1; (1913)	1
FAILED		
Hahnemann Med. Coll. and Hospital of Philadelphia	(1916)	71.6
Jefferson Medical College of Philadelphia	(1915)	69.8
University of Pennsylvania	(1912)	62.6
University of Berlin	(1908)	73.4
Royal University of Naples	(1892) 60; (1895) 62.2; (1905)	33

* Graduation not verified.

Rhode Island January Examination

Dr. B. U. Richards, secretary of the Rhode Island State Board of Health, reports the practical and written examination held at Providence, Jan. 3-4, 1918. The examination covered 7 subjects and included 70 questions. An average of 80 per cent. was required to pass. Of the two candidates examined, 1 passed and 1 failed. The following colleges were represented:

College	Year Grad.	Per Cent.
PASSED		
George Washington University	(1906)	88.2
FAILED		
Laval University	(1900)	74.5

Book Notices

A Doctor's Diary in Damaraland. By H. F. B. Walker. Cloth. Price, $2.10 net. Pp. 202, with illustrations. New York: Longmans, Green & Co., 1917.

The author was one of the physicians of South Africa who, on the breaking out of the rebellion, offered their services to the Union. He was called on for active service in February, 1915, at which time he was appointed to one of the mounted field ambulance units attached to General Botha's army. This book is a record, in the form of a diary, of Dr. Walker's adventures and observations from the time he left Cape Town till his return. Owing to the nature of the country, his experiences were exciting, as may be imagined, and he had to endure many hardships. Damaraland is, or was, a German province of South Africa, and the scene of General Botha's successful war with the Germans. Usually the author's unit was far from the scene of actual conflict, and he did not know that fighting had taken place until the wounded came in; consequently one can get only a vague idea of the military aspect of this remarkable campaign, which deprived Germany of the colony. However, while the book gives only a vague idea of what Botha did, it gives a graphic description of the life of a medical officer connected with a rapidly moving army in an unusually wild, desolate country. For days at a time, Dr. Walker and his unit were practically without water or food for either animal or man, and often they suffered from heat in the day and from cold at night. The book is both interesting and enlightening: it is enlightening in that it gives one an idea of the country, of the Germans' methods of colonizing and, above all, of how far-reaching this great war really is. In reading of Botha's campaign in South Africa, we may have regarded it merely as one of England's isolated campaigns with Germany. This book reveals that it was far from insignificant—rather that it was an important and costly campaign, especially for the Germans, and one of far-reaching possibilities. After all, however, the book is interesting and important to medical men as a revelation of what army surgeons have to and can do under difficult circumstances, and in spite of hardships.

Kirkes' Handbook of Physiology. Revised and Rewritten by Charles Wilson Greene, A.M., Ph.D., Professor of Physiology and Pharmacology, University of Missouri. Ninth American Revision. Cloth. Price, $3.75. Pp. 790, with 509 illustrations. New York: William Wood & Co., 1917.

For the information of those unfamiliar with the general plan of this well known textbook, the following brief statements might be made: Three introductory chapters, dealing with the phenomena of life, structure of the tissues (histology), and an outline of physiologic chemistry, cover 117 pages of text. The succeeding chapters deal with mechanical and chemical physiology, many chapters ending with laboratory experiments on the particular subject under discussion. The text ends in the conventional manner with two chapters (Chapters XVI and XVII) on the reproductive organs and development, followed by a carefully prepared subject index.

It is apparent that the book is not designed for study by medical students, or as a reference book for physicians. This follows from the extensive, illustrated treatment of histology and elementary physiologic chemistry, subjects that are usually classed as prerequisites to physiology. Again, the majority of the laboratory experiments are quite simple. Some, on the other hand, are difficult, and need special training and apparatus not usually found in the laboratories in which the book will be used to the best advantage (those dealing with calorimetry or plethysmography). Whereas quite a number of laboratory experiments concern digestive juices and elementary urinalysis, there are none on absorption or on the cerebrum, cerebellum or spinal cord. With the inadequate instructions given in the paragraphs dealing with laboratory directions for experiments on vision, it is not clear how the student will learn the principles of ophthalmoscopy and retinoscopy, much less be able to fit "glasses for himself and at least two others." The method of using an ophthalmoscope is most superficially described under the heading "retinoscopy," with only fleeting and inadequate reference to the direct and indirect methods or the physical principles involved. Corneoscopy is performed with a Javal-Shiötz ophthalmoscope (?). Retinoscopy or skiascopy is not mentioned except where the term "ophthalmoscopy" should have been used. It appears that in the text and laboratory directions the author confuses retinoscopy with ophthalmoscopy as these terms are commonly used. When the student is recommended to fit glasses for himself and two others, more and better information should appear in the text and laboratory instructions.

As a textbook, it assumes a rank intermediate between a high school physiology and one designed for medical students. The book is serviceable for college students and students of dentistry, for the presentation is, on the whole, good, and the subject matter brought up to date.

The distinction between myxedema and cretinism is, to say the least, poorly expressed. It is not certain that most physiologists would agree to the statement that the "parathyroids are intimately associated with the thyroids in the constructions of the thyroid compound," or that the "parathyroids contain iodin." Furthermore, when the best experimental evidence points to the conclusion that death following complete suprarenalectomy is due to the removal of the cortex and not the medullary portion of the suprarenal gland, it is rather disappointing to find no mention of this fact, particularly when the importance of epinephrin's coming from the medulla is probably overemphasized, as appears from the recent experimental work of Stewart.

There are many instructive illustrations in the text. Some of the older ones might profitably be replaced by better ones. Those illustrating the chapter on the nervous system are especially commendable. The typographic errors are not numerous. "Chromofile" is, possibly an etymological mistake. Again, like other revisions, some of the illustrations are credited to "Moret" instead of to "Morat." The other errors are inconsequential.

Medicolegal

Choice of Remedies in Action for Malpractice

(*Stokes vs. Wright* (Ga.), 93 S. E. R. 27)

The Court of Appeals of Georgia, Division No. 1, in affirming a judgment in favor of the defendant, says that this was the second action brought by the plaintiff against the defendant, to recover damages for alleged negligence in an operation performed by the defendant on the plaintiff, Nov. 25, 1913. The first suit was filed to the January, 1916, term of the superior court, and was what is called an action in tort, or for a wrongful act not considered as a breach of contract. The defendant demurred generally, and also on the special ground that the alleged cause of action, if any existed, was barred by the statute of limitations. The demurrer was sustained and the petition dismissed, after which the plaintiff filed the present suit to the September, 1916, term of court, alleging the same facts as his cause of action, but claiming damages for the breach of the implied contract between himself and the defendant which resulted from the alleged negligent operation. Again the defendant demurred, and his demurrer was sustained, the court of appeals holds properly so, because the plaintiff, having elected in the first action to sue on the alleged tort, was bound by that election, and, his cause of action therefor being barred, he could not afterward prosecute this action for alleged breach of contract. When a person has two or more conflicting and inconsistent remedies for the same wrong, his election and actual prosecution of the one to a favorable or an adverse decision is a bar to the others. The plaintiff had the right to bring his action in tort, or for the breach of duty arising out of the contract of employment, express or implied. But he would not be permitted, after the choice of one of several inconsistent and conflicting remedies, which he might originally have pursued at his option, to change his position and take a course wholly inconsistent with the remedy which he first selected. When he elected to sue in tort and actually commenced his action for the tort, and prosecuted it to an

adverse decision, his right to sue on the contract was lost. It was of no avail that the statute of limitations had already barred the action in tort at the time of the filing of the plaintiff's first suit. His election to sue in tort related back to the original wrong, and to his rights as they then existed. In other words, owing to the nature of the relation between a physician and a patient, the latter, in the case of malpractice by the former, ordinarily has a choice of remedies, and may sue the physician either in contract or in tort. If he elects to sue in tort, and actually commences and prosecutes his action to a final adverse decision, his right to sue as for a breach of the contract, or a breach of the duty imposed by law, by reason of the defendant's calling and the relation between the parties, is lost. And this is true although at the time of the commencement of the action for the tort it was barred by the statute of limitations. The election to sue in tort, and the prosecution of such suit to final judgment, relates back to the original transaction out of which the action arose, and constitutes an irrevocable election of remedies as they then existed on the part of the patient.

Position of All-Time County Health Officer

(Harrington vs. State ex rel. Van Hayes (Ala.), 76 So. R. 422. State ex rel. Smith et al. vs. Justice (Ala.), 76 So. R. 425)

The Supreme Court of Alabama holds, in the first or Harrington case, that the position or place of an "all-time" health officer for a county is not an "office," within the meaning of Section 1467 of the Code of 1907; or, in other words, that appellant Harrington was not an officer of the state, or holding or attempting to hold an office under the authority of the state, within the meaning of that section, and, for that reason, that he was not required to be an elector of the state to be eligible to his position. If a county health officer is an officer within the meaning of Section 1467, then it would seem that he is a county officer within the meaning of Section 175 of the Constitution—in which case he would be removable only by impeachment, as provided by the Constitution. The statutes providing for such health officers prescribe other summary modes for their removal from office. If, therefore, they are county officers, these various statutory provisions as to their removal from office would be void. This court is committed to the construction of the state health and quarantine laws as creating a system which places the entire control and management of these subjects in the hands of the state board of health, and the respective boards for the several counties acting under the state board. The statutes also provide for various agents, employees, and officers of these various boards, state and county; and these are mentioned in the statutes as state and county officers, and, at other times and in other places, as officers of the boards which elect or appoint them. To treat or construe them to be officers of the boards, and not of the state and county, gives the entire system harmonious operation and effect as expressly written and provided.

In the second or Justice case, the court holds that when the court of county commissioners of Elmore County, in the exercise of the delegated power, declared, by proper resolution entered on the minutes of that court, that the terms of the act of the legislature of Sept. 25, 1915, should have effect in Elmore County, by the establishment of the office of public health, to be filled by a reputable practicing physician of the county "to be elected by the county board of health," and that his duties should be those defined by the provisions of the act having application to such county health officers, and directed the judge of probate to notify the chairman of the county board of health of this resolution and order, and by the resolution fixed the salary of the health officer at the sum of $2,100 per annum, to be paid monthly on the warrant of the judge of probate out of moneys in the general fund of the county, and further notified the county board of health of this action, the discretion and power of the court, under the amended statute as to the health officer in Elmore County, ceased. On this notice from the court of county commissioners, it became the duty of the county board of health to elect an incumbent in the office, and when that board, by the election of Dr. Justice as county health officer, discharged its delegated authority from the legislature, it was without further power or duty in that behalf. And Dr. Justice's employment, election or status, as health officer, was fixed, on his qualification and the assumption of the duties of his office, subject to the several provisions of the amendatory acts relating to his term of office, duties and incumbency therein. The county board of health may not compel the board of revenue or court of county commissioners to exercise the discretion reposed in the court or officials by the act, or control that discretion to declare, within the terms of the act, the necessity for the health officer. Similarly, the board of revenue or court of county commissioners may not control the county board of health, in the exercise of its discretion and power to elect or direct the "all-time" health officer for the county within the provision of the act. It cannot revoke its order declaring the necessity for an all-time health officer and putting into operation in the county the provisions of the statute.

Society Proceedings

COMING MEETINGS

AMERICAN MEDICAL ASSOCIATION, CHICAGO, JUNE 10-14.

Am. Assn. of Pathologists and Bacteriologists, Philadelphia, Mar. 29-30.
American Orthopedic Association, Washington, D. C., April 22-23.
South Carolina Medical Association, Aiken, April 16-18.
Tennessee State Medical Association, Memphis, April 9-11.

FEDERATION OF STATE MEDICAL BOARDS OF THE UNITED STATES

Annual Meeting, held in Chicago, Feb. 5, 1918

The President, DR. DAVID A. STRICKLER, Denver, in the Chair

Medical Licensure and Standards

DR. DAVID A. STRICKLER, Denver: The enforcement of the law and regulations against limited practitioners—the cults—is one of the most perplexing problems in all the states in which limited licenses are provided. Colorado has attempted to meet it by printing in a prominent place on the face of the license the statutory provision and limitations. This is done to inform the public of the limitations and to assist in the administration of the law. Thus far no infractions of the law have come to our knowledge.

As to reciprocity, such licenses should not be influenced by reciprocity agreements, but should rest wholly on evidence of good moral character, satisfactory practice record, and educational qualifications, without reference to the attitude of the state from which the applicant comes.

A year ago we advocated the reporting to a central organization of all information relative to medical crooks and frauds, practitioners of ill repute, revocation of licenses, legal actions brought against practitioners for violating the medical practice act, commitments after conviction for criminal acts, etc. I have given the subject much thought, and believe it is not feasible for the federation to organize and maintain a central body, because of the large amount of detail and expense involved. My suggestion is that the federation by resolution or otherwise encourage its members to send all such data to the Biographic Department of the American Medical Association.

Difficulties in the administration of practice acts are due largely to an indifferent public. A great service would be rendered the membership generally by a sustained effort on the part of the medical profession toward educating laymen as to the high aims of the medical profession in general and on public health matters in particular.

In regard to standards of medical education, the committee of the federation is making progress. Some members of the federation claim that the evaluation of colleges has been well done by the Council on Medical Education of the American Medical Association, and that we should accept its ratings. While acknowledging the value of the work done by that body, I am of the opinion that the purposes served by the two bodies are so distinct that each should establish its own standards.

I believe it is a mistake that any state establish different standards for those who are licensed to practice the healing art. Fake educational institutions should be prohibited by every state in the Union. This prohibition can be accomplished through legislative enactments which require bona fide educational standards of all institutions chartered to teach any profession.

Uniformity of Reciprocity Applications

MR. F. C. DODDS, Superintendent of Registration, Department of Registration and Education, Springfield, Ill.: We have heard a great deal about the standardization of schools and colleges, but not about the standardization of examination. That is equally as important as the standardization of colleges. In the last year I have issued fifty reciprocal certificates to physicians and surgeons. The blanks that come to us in the ordinary course of business are voluminous. It makes no difference to the State of Illinois if, we will say, a physician from Colorado comes to us; all we want to know is that he has met the requirements of the Colorado board in the matter of education, and also that he has passed a successful examination before that board and is certified to us by that board as being a reputable practitioner. It matters not to us what form of certificate or license was issued to him, how many names of members of examining committees are shown on the license, and the exact wording of it. All we are particularly interested in is in knowing that he has fulfilled the requirements for preliminary education and has passed a successful examination. This federation should undertake to prepare a uniform blank covering the different requirements that would be needed in the way of photographs, preliminary education, etc.

Since July 1, 1917, the examining board of Illinois has had but one applicant for a license to practice osteopathy, and he passed. We have not had an applicant from a chiropractic school that could qualify. We have not issued a license to a chiropractor since July 1, 1917, and I do not think we will issue a license to any one to practice chiropractic for many years to come, because the educational requirements for the chiropractor in Illinois are the same as for the physician and surgeon.

Sectarianism in the Science of Healing, as Treated in Legislative Acts and Judicial Decisions

MR. HARRY EUGENE KELLY, Chicago: The fundamental thing for consideration in the regulation of the practice of healing is the question of cults or sectarianism. No matter what the educational standard is, some one will not be able to reach it, and that somebody will desire, nevertheless, to practice healing. Since he cannot attain the educational requirements, he will go about seeking some other means by which he can get into the profession. A man who wants all the advantages of practice without going through hardships to qualify for those advantages usually organizes a society of some sort and makes it appear that the society is organized for some great benefit to the public. These persons begin through their associations to bombard the legislature, because the legislature makes the laws. They tell the members of the legislature that they have worked hard in trying to qualify themselves to do the public great good, and yet it is nothing but camouflage.

The object of a medical practice act is to create a standard, and anybody reaching that standard and passing an examination should be entitled to practice by any method of healing he desires. The object of the law is to require a man to be able to diagnose a case and prescribe some form of treatment for it, leaving him free to practice whatever method of healing he pleases. It is hard to get members of the legislature to understand that. All persons interested in the science of healing should maintain that all persons who heal disease as a profession shall be required to pass examinations in the same subjects before they shall be permitted to heal according to any method whatever. Nothing else is logical.

Responsibilities of State Boards in the Present War Emergency

DR. C. E. SAWYER, Marion, Ohio: Before the war began, small communities were lacking medical attention because recent graduates, after an expensive and extensive preparation, could not afford to accept the remuneration obtainable in small communities. Since the war this condition has been increased by the call of medical men to the colors.

With 17,000 physicians already under commission and many others needed in the making of our next army, there is an increasing gap in our supply of physicians. To provide for this is one of the responsibilities brought about by the war. At least three years could be saved in the system of the medical student's education and still have the actual standard of service as high as at present.

Our public school system should be organized on a more business-like basis, and students should be directed into vocational and professional channels earlier. This would save two years in the grades and another year could be eliminated from the college and medical course.

The restrictions and requirements of some states are senseless. Medicine must be broader than state's rights; it must be directed by a national legalized body with power to act.

With hospitals and colleges being standardized by various state board committees acting separately, no real standard can be maintained. The medical boards are the only real authorities for proper standards.

This federation should create a commission with power to act in the following important matters: 1. The fixing of premedical requirements consistent with a reasonable and regulated practical course. 2. The standardization of medical colleges on the basis of a minimum requirement fixed by the federation. 3. The standardization of hospitals on the basis of two classes, general teaching hospitals and special hospitals. 4. The creation of a national reciprocal requirement that will be just and equable.

ANNUAL CONGRESS ON MEDICAL EDUCATION, PUBLIC HEALTH AND MEDICAL LICENSURE

Held in Chicago, Feb. 3, 1918

(*Concluded from page 568*)

JOINT SESSION OF THE COUNCIL WITH THE FEDERATION OF STATE MEDICAL BOARDS

The Civil Administrative Code of Illinois and Medical Licensure

This paper, by MR. FRANCIS W. SHEPARDSON, Director of Registration and Education, Springfield, Ill., is to be published in THE JOURNAL.

The General Problem of the Minor Forms of Healing

HON. HOWELL WRIGHT, State Senator of Ohio, Cleveland: Education is the fundamental basis for licensure of the limited or unlimited practice of medicine. With few exceptions, the present system and laws pertaining to medical licensure place too little emphasis on education. Our medical laws are prohibitive rather than based essentially on educative standards. A great majority of the ninety-three separate and independent boards in the fifty states, having to do with the licensing of those who seek to practice the healing art, are not educational, but politicomedical boards. An examination of the medical practice acts indicates that in a majority, including Ohio, the legal fundamental basis of medical practice is commercial. In any criminal procedure aimed to protect the public from ignorant practitioners, the question to be proved should be, "What are the man's educational qualifications for the work in question?" and not, "Did he get a fee?" The fact that this use of the police power of the state was delegated primarily to detect and prosecute quacks does not justify the emphasis of the commercial factor of medical practice over and above the educative.

It is fundamentally wrong to lodge the police power of the state in the hands of representatives of any profession to prescribe the educational qualifications of that profession, to govern its license, and to regulate its practice. It was

undoubtedly necessary for the medical profession to take the lead in advocating our present licensing system and medical laws. However, it should no longer have to fight every year in the legislature as the guardian of the public interests in opposition to other healing professions. It can well continue to advocate higher educational qualifications for the degree of Doctor of Medicine and for the license to practice. It has no fear of serious competition from other healers. If it continues to render effective service, the public will demand that service.

The general educational board or a department of education and registration should gradually supersede the present system of politicomedical licensing boards. Ohio is undoubtedly ready to consider one of these plans. In general, if the board plan is adopted, no healing profession to be regulated by the board should be represented on it. The advice and assistance of representatives of the various healing professions can be secured in technical and professional matters, but final authority—subject, of course, to the legislature—over all that pertains to the examination and licensing of these professions must rest in the hands of the board, or like the Illinois plan of a department headed by a well qualified lay educator. The states must soon choose between further extension and multiplication of the modern "guild controlled" licensing system and the single licensing educational board or department.

There should be more systematic state control and regulation of educational institutions existing for the purpose of granting professional degrees. The present loose system in some states makes the inspection and recognition of certain schools by the licensing authorities almost impossible, and is a decided bar to the enactment of modern legislation.

Uniform educational standards should be applied to all medical cults or sects. If the minor forms of healing, including optometry, osteopathy, chiropractic, etc., are the practice of medicine or the healing art in the sense that "the practice of medicine means the science of preserving the health and treating diseases for the purpose of cure, whether such treatment involves the use of medicinal substances or not," then the same educational standards must be applied to them as to the doctor of medicine. If not, they should be regulated as "limited practitioners," and their educational qualifications gradually raised to standards corresponding to their work.

There seem to be reasons why those who seek to cure disease by spiritual means or prayer, in obedience to the tenets of a recognized church, should be exempt from the application of the educational standards. The contagious disease problem, however, presents the element of doubt. Spiritual healers are now exempted in some states on religious grounds, subject to certain safeguards. There is no reason for any exemption from any law pertaining to public health or welfare.

The United Service Medical School

DR. ISADORE DYER, New Orleans: The excellent college laboratories, the abundance of clinical material, and the hearty cooperation of the faculties of the medical schools both in Chicago and New York have fully satisfied the National Board of Medical Examiners that the plan of conducting examinations in the large cities is a decided step in advance. It affords a broader scope in the examinations themselves and brings the work of the board to the notice of men engaged in medical education to whom the operation of the board and its purposes should appeal as to no other class of men.

The members of the National Board of Medical Examiners have sacrificed many personal interests and devoted much time to the problems of medical education and of developing standards, in the hope that the results may make for a stable future. The successful candidates are gratified at their achievement, and more than one of those who have failed have remarked that it was a privilege to undergo the test, even though unsuccessful.

Most men who apply for the federal services might be better trained before they actually qualify for service. This can be done in a school especially devised for that purpose. The young man who is ambitious to reach the best efficiency in either the Army or the Navy goes to West Point or Annapolis for his training. Why should not such an opportunity be afforded for a young man who wants to enter the medical departments of the services? It is practicable in more than one way:

1. By the establishment of a national medical service school in which students with the standard preliminary education may be received for a period of five years for training as a medical officer in one or another of the federal services. From the beginning, his laboratory training, his class work and his vacation periods may be planned to train him to the fullest efficiency, and at the end of the second year of such a school course, the student might elect or might be required to elect the department in which he wishes to enter when graduated, so that the remainder of his course could be arranged to fit him for Army, Navy or Public Health Service, as he may have chosen. The detail of the curriculum plan could be worked out as easily as in any of the technical schools where specialty courses are arranged.

2. The second plan, and one which might easily be started as the beginning of a school which could later expand into the first plan suggested, is to take over students who have already completed two or more years in a first grade medical school, giving them the three years of special training in the service of their election. Such a plan could successfully provide hospital and laboratory training in the government hospitals and institutions, and could afford field or service training during vacation periods. The consummation of such a plan is not difficult if it is decided on. Already the Army, the Navy and the Public Health Service have established laboratories and teaching facilities. At the same time, there are enough government and civil hospitals in Washington to afford clinical material. There are enough experienced and trained teachers in the several services to make a large and necessary part of a faculty which might be readily augmented by picked men from civil institutions. There should be a careful plan for organization of such a school, and particularly with reference to the faculties, so that the common aim of efficient training may be arrived at, without too great preponderance of military technic.

DISCUSSION

DR. JOSEPH BYRNES, New York: With all our equipment, with all our medical education, why is it that an untrained spiritual healer is able to step into a case and turn us clean out? The profession has not bothered itself about it. We have been doing nothing in the way of educating the people to meet that. We know the psychologic side of medicine, but we do not practice it. If we did practice it, the faith healer would not have such a foothold.

DR. J. HENRY CARSTENS, Detroit: Why do the Christian Scientists beat us to it? Because they lie, and the worst feature about it is, they don't always know that they lie. They go to a patient's bedside and say they can cure him. They hypnotize that patient. On the other hand, we are frank and conscientious and do not hesitate to tell a patient that we cannot cure him if he has an incurable malady. Knowledge will succeed in the end; but in the meantime faith healers are having case after case of contagious diseases that they do not report. These diseases are transmitted from person to person, and many of them die, especially children, because they catch the contagion from some other patient.

DR. SIVERS, Centerville, Ohio: The average medical man has studied medicine purely from a physical standpoint. The reason why faith healers beat us to it is that some cases of sickness are purely psychologic. There are other cases that are pathologic. The medical man comes in and does his work so far as the pathologic part of that individual is concerned, but he is ignorant, as a rule, of the psychologic condition of that patient. Osteopathy, chiropractic, hypnotism and healing by prayer are all based on the fact that the operator believes that he is doing something toward healing the patient, not because he does it, but because he believes he does it, and inflicts that belief on the psychologic nature of the patient, and gets the patient to believe that he is having something done for him.

Current Medical Literature

AMERICAN

Titles marked with an asterisk (*) are abstracted below.

American Journal of Orthopedic Surgery, Boston

December, 1917, **15**, No. 12

1 *Lumbosacral Pains Considered Anatomicaly. G. G. Davis, Philadelphia.—p. 803.
2 Gynecologic Paper. W. P. Graves, Boston.—p. 807.
3 Cord and Nerve Affections Causing Low Back Pain. C. H. Henninger, Pittsburgh.—p. 814.
4 *Genito-Urinary Causes of Low Back Pain. T. Baker, Pittsburgh.—p. 819.
5 Displacements of Bones as Cause of Low Back Pain. F. J. Fassett, Seattle.—p. 826.
6 Gutter Ankle Splint. W. J. Merril, Philadelphia.—p. 840.

1. **Lumbosacral Pains Considered Anatomically.**—Davis emphasizes the fact that localized pain and tenderness is good evidence of local injury. Referred pains can originate from such a multitude of sources as to render them extremely unreliable for diagnostic purposes. That the most common cause of pain is rupture of ligaments; that sometimes overstretching the nerves is a cause, and finally, that while displacements of the various joints, including the sacro-iliac, do occur, it is exceptional for them to be of sufficient extent to produce positive objective evidence of their occurrence and rarely, if ever, to demand manipulation for their reduction. From the viewpoint presented by Davis it follows that benefit should be derived from apparatus so constructed as to support, fix and limit the extent of motion of the parts involved.

4. **Genito-Urinary Causes of Low Back Pain.**—Baker's experience with low back pain due to genito-urinary causes is limited to 41 cases collected from a series of 146 cases of chronic prostatitis and spermatocystitis. There were 15 cases in which the pain was purely sacral or lower lumbar, and constituted a prominent symptom; in 5 cases there was pain over the sacrum and one or both sacro-iliac articulations, and radiating along the course of the sciatic nerve; 6 patients had pain localized over the sacro-iliac articulation on one or both sides; there were 8 cases in which the pain was sacral, but radiated along the sciatic nerve on one or both sides; 5 cases in which the pain was localized definitely over one or both sacro-iliac articulations or gluteal areas and radiated along the sciatic nerve; and of sciatic pain alone, simulating mild sciatica, there were but 2 cases. The frequent occurrence of pain radiating along the sciatic nerve is very striking, and in many of the cases it was very annoying. In none of the cases was there tenderness along the course of the nerve, which distinguishes this type of pain from true sciatica. Of the 41 cases, 25 were nongonorrheal (that is, there had been no history of gonorrhea within three years, and no gonococci were to be found in the prostatic secretion, yet in some of these the specific infection was primary); other organisms were found, however, principally bacilli and cocci. The 16 remaining cases were definitely due to gonococcus infection.

American Journal of Public Health, Boston

January, 1918, **8**, No. 1

7 War and Mental Diseases. P. Bailey.—p. 1.
8 Red Cross and War. W. H. Frost, Washington, D. C.—p. 8.
9 Rehabilitation of Diseased and Injured Soldiers Due to War. E. G. Brackett, Washington, D. C.—p. 11.
10 Morbidity Reports and Records of Army. W. P. Chamberlain.—p. 14.
11 Classroom Ventilation and Respiratory Diseases among Schoolchildren.—S. J. Baker, New York.—p. 19.
12 Industrial Hygiene in Wartime. W. G. Thompson, New York.—p. 27.
13 Rats and Insects as Public Enemies. W. T. Sedgwick, Cambridge.—p. 34.
14 Work of Public Health Committee of Massachusetts Medical Society. E. H. Bigelow, Framingham.—p. 35.
15 Conservation of Child Life. W. J. Galivan, Boston.—p. 37.
16 *Relation of Streptococci to Bovine Mastitis and Septic Sore Throat. D. J. Davis, Chicago.—p. 40.
17 Activated Sludge and Treatment of Packinghouse Wastes. L. Pearse, Chicago.—p. 47.
18 Activated Sludge Test at Cleveland. R. W. Pratt, Cleveland.—p. 55.
19 Why Life Insurance Companies Should Ally Themselves with American Public Health Association. C. J. Hastings.—p. 61.

16. **Streptococci and Septic Sore Throat.**—The question of pasteurization is an interesting one in relation to these infections. In the case of several epidemics in this country, Davis says, that the infected milk had been pasteurized by the "flash" method and the evidence in all indicated quite clearly that the milk was contaminated before pasteurization. Therefore the "flash" method is inefficient. The harm it may do by giving people a sense of false security is also self-evident. In certain epidemics the milk was consumed raw. It would seem that the only safeguard against such epidemics is efficient pasteurization not only of the milk and cream, but also of the material entering into the manufacture of other milk products. It is a point of some importance that it is not uncommon for firms to sell pasteurized milk but to sell cream in the raw state. The latter is even more dangerous than milk. The question as to what constitutes efficient pasteurization for streptococci is one that requires further study. It is commonly stated in the literature that pathogenic streptococci are killed at relatively low temperatures (52-54 C. for ten minutes, Sternberg). Undoubtedly for many strains this is altogether too low. The recent work of Ayers and Johnson indicated that the thermal death point of typical streptococci varies considerably and one of twenty-two strains studied by them resisted heating for thirty minutes at 62.8 C. (145 F.) the usual temperature for pasteurization. Furthermore their viability in milk and milk products should be carefully studied since we know that media may exert an important effect on the resistance of organisms to heat. In Davis' work in which ninety-eight strains of streptococci were tested none of twenty-four pathogenic hemolytic streptococci of human origin resisted 60 C. (140 F.) for thirty minutes. Twenty of seventy-four strains of hemolytic streptococci of milk origin and having practically no virulence resisted 68.3 C. (155 F.) for thirty minutes. Davis knows of no evidence to indicate that strains of streptococci pathogenic to man can resist the usual temperature for pasteurization (145 F. for thirty minutes).

American Journal of Syphilis, St. Louis

January, 1918, **2**, No. 1

20 Intraventricular Treatment of Paresis. N. Sharpe, New York.—p. 1.
21 Syphilis of Inner Ear and Eighth Nerve. G. W. Mackenzie, Philadelphia.—p. 9.
22 Syphilis of Ear. V. Dabney, Washington, D. C.—p. 26.
33 Syphilis and Malignancy. B. P. Thom, New York.—p. 40.
24 Syphilitic Aortitis. L. A. Levison, Toledo.—p. 45.
25 Condyloma of Umbilicus. A. G. Rytina, Baltimore.—p. 64.
26 Masses in Neck. I. Cohn, New Orleans.—p. 67.
27 Tatooing and Syphilis. A. Keidel and E. L. Zimmermann, Baltimore.—p. 83.
28 Skeletal Roentgenography as Aid to Diagnosis of Obscure Syphilis. W. P. Coues, Boston.—p. 97.
29 Blood and Cerebrospinal Fluid in Three Hundred Known Cases of Syphilis. C. C. Dennie and D. O. Smith, Kansas City, Mo.—p. 101.
30 Technic of Bordet-Wassermann Reaction. H. K. Detweiler, Toronto, Canada.—p. 120.
31 Treatment of Early Syphilis in Relation to Development of Neurosyphilis. L. G. Lowrey, Boston.—p. 138.
32 Syphilis Clinic of Emory University, Atlanta, Ga. W. B. Emery, Atlanta, Ga.—p. 142.
33 Syphilis and War. H. H. Hazen, Washington, D. C.—p. 144.
34 Effect of Venereal Diseases on Infant Mortality. F. H. Bartlett, New York.—p. 156.
35 Adequate Treatment for Syphilis. H. G. Irvine, Minneapolis.—p. 167.

Archives of Internal Medicine, Chicago

February, 1918, **21**, No. 2

36 *Transient Complete Heart Block with Numerous Stokes-Adams Attacks. F. N. Wilson and G. C. Robinson, St. Louis.—p. 181.
37 *Endocrine Origin of Muscular Dystrophy. N. W. Janney, S. P. Goodhart and V. I. Isaacson, New York.—p. 188.
38 *Studies in Acute Nephritis. E. H. Mason, Montreal, Que.—p. 216.
39 Papillary Carcinoma of Kidney with Metastasis in Brain. E. F. Hirsch, Chicago.—p. 231.
40 *Relationship of Toxic Lymphoid Hyperplasias to Lymphosarcoma and Allied Diseases. D. Symmers, New York.—p. 237.
41 *Chemical Changes in Blood and Urine in Progressive Muscular Dystrophy, Progressive Muscular Atrophy and Myasthenia Gravis. F. H. McCrudden and C. S. Sargent, Boston.—p. 252.
42 *Nature of Pathologic Process in Progressive Muscular Dystrophy. F. H. McCrudden, Boston.—p. 256.
43 *Effect of Thyroid Secretion on Excitability of Endings of Cardiac Vagus. R. L. Levy, Baltimore.—p. 263.

44 Maintenance Diet in Diabetes Melitus as Determined by Nitrogen Equilibrium. H. O. Mosenthal and S. W. Clausen, Baltimore. —p. 269.
45 Distribution of Bile in Certain Types of Jaundice. M. A. Blankenhorn, Cleveland.—p. 282.
46 *Experimental Intestinal Obstruction. F. L. South and L. L. J. Hardt, Chicago.—p. 292.

36. **Transient Complete Heart Block.**—A case is cited by Wilson and Robinson which is of interest because electrocardiographic records were obtained during several Stokes-Adams attacks, and also as an example of transient complete heart block. The electrocardiograms taken shortly after the patient entered the hospital and while she was having syncopal attacks, revealed the presence of complete auriculoventricular dissociation with frequent periods of ventricular standstill lasting from seven to eleven seconds, and corresponding to the syncopal attacks. On the following day, complete dissociation returned for a time, but there were no periods of ventricular standstill and the complete dissociation quickly gave place to a 2:1 block. Four days later the only sign of defective conduction which remained was a prolongation of the P-R interval which measured 0.31 second. Thereafter, the improvement in conduction was less rapid, but by the sixteenth day the P-R interval had decreased to 0.20 second. During this time there was also a rapid improvement in the patient's general clinical condition. The general picture, then, was one of complete dissociation with the rapid idioventricular rate and ventricular standstill causing Stokes-Adams syndrome. This was followed by improvement associated with a rapid decrease in the grade of the heart block.

The authors are of the opinion that the ventricular stoppage was partly dependent on the abnormal character of the ventricular rhythm during the periods of ventricular tachycardia. The length of the periods of ventricular standstill was apparently determined by the time required for sufficient improvement in the auriculoventricular conductivity to allow an auricular stimulus to reach the ventricles; for, as the degree of block diminished the periods of ventricular standstill became shorter. The periods of standstill were apparently never long enough to allow the usual slow idioventricular rhythm to develop. Three factors, then, took part in the production of the syncopal attacks: the abnormal character of the ventricular rhythm, the high grade of heart block, and the slow development of the idioventricular rhythm. The cessation of the syncopal attacks was apparently due to the occurrence of ventricular contractions arising in the left ventricle during the long ventricular pauses. The rapidity with which the block cleared up suggests that it was not due to some destructive lesion of the A-V bundle, but to some toxic or acute inflammatory process. The patient's history and the slight fever on the day of admission to the hospital indicate that she had recently had an acute infection. The presence of an old endocarditis and possibly a chronic myocarditis indicated by the history and the presence of mitral regurgitation may have been a contributory factor.

37. **Muscular Dystrophy.**—The metabolism in nine cases of muscular dystrophy was studied by the authors. In addition to certain disturbances in the creatinin creatin metabolism, there was observed constant hypoglycemia and impaired utilization of carbohydrate. The metabolic picture presented is essentially the same as that recorded in the diseases of unquestionable endocrine origin (myxedema, hypopituitarism and Addison's disease) and after experimental removal of the thyroid or suprarenal glands in animals. In view of these metabolic findings, also the clinical as well as pathologic, the authors believe that it seems justifiable to regard muscular dystrophy a result of dysfunction of the ductless glands.

38. **Acute Nephritis.**—Studies were made by Mason in three cases of acute nephritis which demonstrate that in very severe cases of acute nephritis the kidney function during the early stages is much better than the actual state of the kidneys would seem to warrant. This is due to the increased stimulation from which they are suffering. With the subsidence of the inflammation the function tends to fall to a very low level, which level is more truly an index of the kidney state. As convalescence is established this level tends to return to that at which the kidneys remain permanently damaged. This "slump" in function takes place simultaneously with a marked improvement in the clinical condition of the patient. Theophyllin probably acts in part by lowering the chlorid threshold, thereby allowing the chlorids to pass out of the blood plasma, water following.

40. **Lymphoid Hyperplasias.**—Since the lymphoid tissues are so frequently exposed to the action of bacterial toxins and irritants brought to them in solution from absorptive surfaces of vast extent, and since, in these circumstances, they so often display a definite tendency to respond to irritation by hyperplasia of their cellular constituents, Symmers thinks it not improbable that a like reaction is to be held responsible for the inception of certain types of disease characterized by overgrowth of lymphoid cells, local or general. If the irritant is withdrawn after the lapse of a reasonable interval of activity the cellular reaction in the lymph node ceases and the hyperplastic process is withdrawn. If, however, the irritant continues to act it appears to be inevitable that the cellular response will also continue. Finally, a time is to be expected at which, either as a result of the activity of the same irritant, or, more probably, as the result of the formation of a self-perpetuating toxin in the lymph nodes concerned, the reaction is converted into a process characterized by indefinite hyperplasia. In the absence of a better explanation, this, according to Symmers, is a not illogical method of accounting for the origin of the lymphosarcomas and for similar otherwise inexplicable lesions of the lymphoid system, including not only certain localized lymphoid hyperplasias, but chronic lymphatic leukemia, pseudoleukemia and the like.

41. **Chemical Changes in Blood and Urine in Progressive Muscular Dystrophy.**—In three cases of progressive muscular dystrophy McCrudden and Sargent found: (1) muscular weakness, (2) hypoglycemia, (3) hypocholesterinemia, (4) creatinuria, (5) normal ammonia excretion, (6) a rise of blood sugar in the treated patients with a parallel increase in strength.

42. **Pathologic Process in Progressive Muscular Dystrophy.**—The facts marshaled by McCrudden indicate that the myasthenia of progressive muscular dystrophy is due to hypoglycemia; that the hypoglycemia and fatty infiltration are due to impaired glycogenesis, the carbohydrate of the food being probably changed largely to fat instead of glycogen; and that this impaired glycogenesis is the result of suprarenal or other endocrine disease.

43. **Effect of Thyroid Secretion on Cardiac Vagus.**—Levy found that in cats pithed to midthorax, repeated stimulation of either vagus with a given strength of stimulus results in a uniform series of responses, both as to degree of depressor effect and duration of cardiac inhibition. After inducing secretory activity in the thyroid gland, even at a time when increased pressor response to a given dose of epinephrin gives evidence that there has been a pouring out of thyroid secretion, there is no significant alteration in depressor effect or duration of cardiac inhibition following stimulation of either vagus nerve. It is therefore evident that after the thyroid gland has liberated its secretion in sufficient amount to sensitize the sympathetic structures acted on by epinephrin in raising arterial pressure, there is no demonstrable effect on the excitability of the endings of the cardiac vagus.

46. **Experimental Intestinal Obstruction.**—South and Hardt summarize their findings as follows: 1. A majority of the dogs with isolated loops succumb to perforative peritonitis. 2. But the development of toxic symptoms and death may occur independently of peritonitis. 3. Symptoms on injection of loop contents are different from those due to absorption. 4. Washing of the loop delays the development of symptoms and onset of death. 5. Loss of body weight is not great enough to be an important factor in the process. 6. Overdistention and strangulation are not necessary factors in the development of symptoms. 7. Animals may live indefinitely with loops draining externally. 8. Animals may live indefinitely with loops draining directly into the peritoneal cavity. 9. Dogs may continue well and active with enormously distended loops that have closed spontaneously.

Boston Medical and Surgical Journal

Feb. 7, 1918, **178**, No. 6

47 Laboratory Methods in Tuberculosis. B. White, Otisvile, N. Y.—p. 175.
48 Problem of Physical Selection Applied to Large Numbers of Applicants. A. F. Downing, Cambridge.—p. 177.
49 Reeducating German War Cripples at Düsseldorf. D. C. McMurtrie, New York.—p. 182.
50 Physical Selection in Its Relation to Heart and Lung Conditions. M. J. Cronin, Boston.—p. 187.
51 *Study of Kidney Function in Senility. W. C. Rappeye, Foxboro.—p. 191.

51. **Kidney Function in Senility.**—Rappleye's study was made on a group of forty-one patients, whose ages ranged from 70 to 88 years. These patients were free from gross evidences of renal insufficiency or other compromising conditions (fever, edema, dyspnea, anemia of note, etc.) and most of them were active workers. Under the conditions of diet and hospital routine the upper normal value of blood urea nitrogen is considered as 15 to 16 mg. per 100 c.c., the blood being drawn before breakfast, twelve to fourteen hours after the preceding meal. Of the cases studied 50 per cent. showed a moderate degree of retention, using the blood urea nitrogen figures as a criterion. Fifty per cent. of the cases showed a systolic blood pressure of 160 mm. or over; a higher percentage showed a diastolic pressure of 85 to 90 mm. or over. The blood pressure readings cannot be said to be related to either the blood urea nitrogen or to the rate of elimination of phenolsulphonephthalein. In twenty-seven cases in which the elimination of phenolsulphonephthalein was determined, thirteen showed a value of 40 per cent. or lower; nine of these were 35 per cent. or lower. A low value of elimination of the dye is associated for the most part with an elevated blood urea nitrogen. A good excretion is related for the most part with a relatively low blood urea nitrogen. Of the cases, 25 per cent. showed albumin in the urine. There were no cases of glycosuria or hematuria. Practically all of the cases showed casts, a customary observation. Sixty-six per cent. of the cases showed either an elevated blood urea nitrogen or a depressed value of phenolsulphonephthalein elimination (40 per cent. or lower). If one disregards the findings of only a few casts in the urine and diregards the blood pressure also, it can be said that, in the group of patients studied, about 70 to 75 per cent. show easily demonstrable evidences of kidney insufficiency. In this group there are several cases showing a relatively low blood urea nitrogen and a good renal function, but which have a considerable elevation of blood pressure, the so-called cases of essential hypertension.

California State Journal of Medicine, San Francisco

February, 1918, **16**, No. 2

52 Tuberculosis of Eye. P. H. Pierson, San Francisco.—p. 74.
53 Complement Fixation in Tuberculosis. B. Jablons, San Francisco.—p. 79.
54 Differentiation of Syphilitic and Tuberculous Pulmonary Lesions. W. C. Klotz, Los Angeles.—p. 82.
55 Metabolism and Disease. L. M. Breed, Pasadena.—p. 85.
56 Practical Value of Complement Fixation Test for Gonorrhea. M. Krotoszyner, San Francisco.—p. 90.

Florida Medical Association Journal, Jacksonville

January, 1918, **4**, No. 7

57 Anatomy of Bladder. F. J. Walter, Daytona.—p. 191.
58 Treatment of Cystitis of Aged. J. Reeve, Deland.—p. 192.
59 Histology of Prostate and Bladder. L. C. Ingram, Deland.—p. 194.
60 Physiology of Kidneys. J. W. Stephens, Deland.—p. 195.
61 Cystitis Complicating Enlarged Prostate. D. T. Smith, Daytona.—p. 196.
62 Treatment of Cystitis. C. C. Bohannon, Daytona.—p. 197.
63 Tuberculosis of Bladder. W. C. Chowning, New Smyrna.—p. 197.
64 Etiology and Pathology of Cystitis. V. Z. Baerecke, Deland.—p. 199.

Illinois Medical Journal, Chicago

February, 1918, **33**, No. 2

65 *Diagnosis of Age of Fetus by Roentgenograms. J. H. Hess, Chicago.—p. 73.
66 Malaria. J. W. Barrow, Carbondale.—p. 88.
67 Obstetrics in Country Practice. J. S. Templeton, Pinckneyville.—p. 90.
68 Extra-Uterine Pregnancy; Report of Case. J. B. Moore, Zeigler.—p. 93.
69 Tuberculosis. M. W. Harrison, Collinsville.—p. 96.
70 Plea for Intensive Treatment of Nervous Diseases. D. S. Booth, St. Louis.—p. 98.
71 Diagnostic Value of Roentgen Ray in Advanced Pulmonary Tuberculosis. M. Biesenthal and E. P. Carroll, Chicago.—p. 101.
72 Chronic Lead Poisoning in Etiology of Pernicious Anemia. A. F. Byfield, Chicago.—pp. 104.
73 Fractures of Pelvis and Resulting Injuries to Urethra and Bladder. H. C. Mitchell, Carbondale.—p. 107.

65. Also published in the *American Journal of Diseases of Children;* abstracted in THE JOURNAL, Dec. 29, 1917, p. 2208.

Journal of Experimental Medicine, Baltimore

February, 1918, **27**, No. 2

74 *Progress of Cicatrization of War Wounds. T. Tuffier and R. Desmarres, Paris, France.—p. 165.
75 *Studies of Oxygen Unsaturation in Venous Blood of Patients with Circulatory Disturbances. C. Lungsgaard, New York.—p. 179.
76 *Oxygen Determinations on Five Patients with Compensated Circulatory Disturbances. C. Lundsgaard, New York.—p. 199.
77 *Oxygen Determinations on Five Patients with Incompensated Circulatory Disturbances. C. Lundsgaard, New York.—p. 219.
78 *Factors Concerned in Appearance of Nucleated Red Blood Corpuscles in Peripheral Blood. C. K. Drinker, K. R. Drinker and H. A. Kreutzmann, Boston.—p. 249.
79 Skin Ferments. E. Sexsmith and W. F. Petersen, Chicago.—p. 273.
80 Intravenous Serotherapy of Weil's Disease (Spirochaetosis Icterohemorrhagica). R. Inada, Y. Ido, R. Hoki, H. Ito and H. Wani, Japan.—p. 283.
81 *Distribution of Spirochaeta Icterohemorrhagiae in Organs after Intravenous Serum Treatment. R. Kaneko and K. Okuda, Japan.—p. 305.
82 *Therapeutic Experiments with Rosenow's Antipoliomyelitic Serum. H. L. Amoss and F. Eberson, New York.—p. 309.

74. **Cicatrization of War Wounds.**—Some hypothetical conclusions bearing on the evolution of cicatricial tissue are suggested by Tuffier and Desmarres. The arterial circulation deposits in the wound chemical substances necessary for contraction of the wound and for epithelial proliferation. When the biologic process is not hindered by any special or severe bacterial infection this deposit is as regular as the circulation itself, and enables us to determine in advance the date of cicatrization. It even seems as though when the epidermization process is retarded by a slight infection the substances necessary for epidermization are stored up in the wound, and when the delay due to infection is removed the epithelium finds an accumulation of nutritive substances, and, so to speak, makes up the lost time. Moreover, when an infection entirely or partially stops epidermization, the authors have observed that after the infection has disappeared the progress of new epidermization is much more rapid than normally; it even passes the calculated curve. The infection apparently destroyed only the epithelium and left in the wound the chemical substances which activate epidermization. The existence of these physical or chemical activating agents has been indicated again by two anatomic clinical facts. In treating a scalp wound in which there had been practically no epidermization for many months. Tuffier and Desmarres applied over the entire surface of the sterile wound dermo-epidermic grafts of fetal skin. After apparently taking, the grafts were absorbed and disappeared, but epidermization of the periphery of the wound, which hitherto had not progressed, took place abundantly, almost a hundred times as much as before. The authors believe that by mathematical measurements they can solve the problem of the action of various organic fluids on the cicatrization of wounds.

75. **Oxygen in Venous Blood with Circulatory Disturbances.**—Thirty-one determinations of the total oxygen combining power and the oxygen in the venous blood from vena mediana cubiti of sixteen resting patients are reported by Lundsgaard. The difference between the total oxygen capacity of the hemoglobin and the oxygen in the venous blood, the oxygen unsaturation, is calculated. In twelve patients with compensated heart lesions the unsaturation was found within normal limits, between 2.5 and 8 volume per cent. In four patients with incompensated heart disease the values for the unsaturation were all above the normal limit, from 9.7 to 15.2 volume per cent. A general discussion of the problem of interpreting the results is given. A comparison is drawn between the oxygen consumption calculated from direct

determination of the blood flow on a normal person (the author) and the oxygen unsaturation determined four years later on the same person. A close agreement between the two series of values exists.

76. **Oxygen in Venous Blood with Compensated Circulatory Disturbances.**—Forty-six determinations of the oxygen unsaturation, that is, the difference between the venous oxygen and the total oxygen capacity of the hemoglobin, have been done in five patients with compensated circulatory disturbances. Values within normal limits and near or below the normal average were found in four patients with regular pulse. In one patient with mitral insufficiency and arrhythmia perpetua extremely varying values were encountered. Six determinations were made; in one instance the value was within normal limits, in five above, and in one of those even higher than in most cases of incompensated heart lesions. A comparison is drawn between the directly determined oxygen unsaturation in these patients and the oxygen consumption calculated from previous experiments by Lundsgaard, in cases in which the blood flow was determined directly by the nitrous oxid method. A close parallelism is found.

77. **Oxygen in Venous Blood with Incompensated Circulatory Disturbances.**—This is a report of 103 determinations of the oxygen unsaturation of the venous blood of five patients with incompensated heart diseases. Values for the oxygen unsaturation within normal limits were found only under two circumstances: (*a*) in a stage of full compensation, and (*b*) in a stage of incompensation in which the symptoms were rapidly lessening. Values above the upper normal extreme were met with under three circumstances: (*a*) during incompensation, (*b*) during compensation just before the clinical symptoms of incompensation had developed, and (*c*) at times in patients with auricular fibrillations in a condition of complete and stable compensation. A comparison has been drawn between the directly found value for the oxygen unsaturation and the values for the oxygen consumption calculated from previous experiments by the writer on the blood flow (minute volume of the heart), in patients with similar clinical conditions. A close agreement existed. It seems probable from experience with patients under digitalis therapy that the oxygen unsaturation affords an objective criterion of the positive effect of the therapy.

78. **Nucleated Red Blood Corpuscles in Peripheral Blood.**—The authors found that increase in circulatory rate caused by hard exercise has no power to dislocate nucleated red cells from the bone marrow either in normal, in anemic, in hyperplastic, or in anemic and hyperplastic animals. In anemic and hyperplastic animals pseudocrises of nucleated red cells can be produced at certain periods by hard exercise, but careful analysis leads inevitably to the conclusion that the increase in these cells is merely a more accurate expression of circulatory content at the time of the procedure. Section of the vasomotor nerves to the four limbs with consequent dilatation of the marrow vessels and increased blood flow through the tissue does not result in the freeing of nucleated red cells from the bone marrow.

81. **Distribution of Spirochaeta Icterohemorrhagiae after Serum Treatment.**—On the bases of their findings the authors believe that they are justified in saying that the immune serum of Weil's disease is capable of destroying the spirochetes found within the organs in man, with the exception of the kidneys, and that the action of the serum on the spirochetes is spirochetolytic and spirocheticidal. The scattered spirochetes in the kidney, on the other hand, are resistant to the action of the immune serum. The spirochetes disappear almost completely from the organs during the convalescent stage of Weil's disease, even when no serum has been administered. The only organ to be excepted is again the kidney, but no comparison between serum treated and nonserum treated cases should be made in this respect, for spirochetes are found numerously in the kidneys even with serum treatment. The disappearance of the spirochetes from the organs and tissues in Weil's disease seems to be not so marked with the subcutaneous serum treatment as with the intravenous method, but the manner of their disappearance is about the same.

82. **Rosenow's Antipoliomyelitic Serum.**—Two series of experiments are described by Amoss and Eberson in which Rosenow's antipoliomyelitic serum, so called, has been compared with the immune serum derived from monkeys which have convalesced or recovered from experimental poliomyelitis. The results of the experiments are unequivocal. They show the Rosenow serum to be devoid of protective power. Moreover, they show that the Rosenow serum acts in the manner of normal horse serum in promoting infection in monkeys from an intravenous injection of the virus, in itself incapable of inducing paralysis. The immune monkey serum possesses, under the same conditions of administration, perfect protective power, as has been shown previously by Flexner and Amoss. The Rosenow serum acts in the manner of normal horse serum; it promotes the passage of the virus of poliomyelitis from the blood into the nervous organs, and it does not protect from infection. The authors have found no evidence that Rosenow's serum under the conditions of the tests is effective therapeutically in monkeys or possesses antibodies of the same nature as those present in the blood of monkeys which have recovered from experimental poliomyelitis.

Kentucky Medical Journal, Bowling Green

February, 1918, **16**, No. 2

83 Treatment of Infected Wounds; Carrel's Technic. G. Loewy, France.—p. 63.
84 Tuberculosis. S. Graves, Louisville.—p. 67.
85 Treatment of Diabetes Mellitus and Complications. H. A. Gilliam, Milburn.—p. 71.
86 Gastric and Duodenal Ulcer. U. V. Williams, Frankfort.—p. 73.

Medical Record, New York

Feb. 9, 1918, **93**, No. 6

87 Some Therapeutic Considerations of Periodic Mental Depressions. L. P. Clark, New York.—p. 223.
88 Food; Classification of Foods; Preparation of Foods. F. F. D. Reckord, Harrisburg, Pa.—p. 229.
89 *Problem of Neurotics in Military Service. A. Gordon, Philadelphia. —p. 234.
90 Thyroid Disease and War. S. P. Beebe, New York.—p. 237.
91 Exaggerated Views About Contagion and Outcome of Pulmonary Tuberculosis. B. Robinson, New York.—p. 238.
92 *Sterilization and Purification of Water with Isotonic Sodium Hypochlorite Solution. W. G. Fralick, New York.—p. 239.

89. **Neurotics in Military Service.**—Gordon directs attention to the fact that types, varieties, and subvarieties of neurotics are many. While all are unfit for actual military work at the firing line, some of them nevertheless are capable of performing some duties of a nature different from fighting. A good number of them could be utilized for work of a secondary character behind the firing line and thus release the men who are more fit to face the enemy. A large contingent of good and strong men will thus be added to the fighting force. The home examining psychiatrist after a profound study of the recruit's personality will determine the variety of the neurosis and the degrees of its development, and will thus be able to make suggestions and recommendations to the military authorities as to the kind of work a given neurotic individual could be assigned to. A systematic plan can be worked out by which the examining psychiatrist will familiarize himself with the multifarious duties incidental to military service in wartime so as to be able to make the proper recommendation in behalf of those neurotic men who are not totally rejected.

92. **Purification of Water with Isotonic Sodium Hypochlorite Solution.**—Fralick has proposed and demonstrated the use of two chemicals for water purification in emergency outfits (Lister bags), so as to produce a safe water, entirely free from objectionable tastes and odors. To do this he has recommended the use of the isotonic sodium hypochlorite solution as a disinfection and the neutralization of the excess sodium hypochlorite by peroxid of hydrogen sodium hypochlorite + hydrogen dioxid = sodium chlorid + water + 20, while the effectiveness of this method had been repeatedly demonstrated at his laboratory, field tests under army conditions were conducted and the testimony of a number of sanitary experts obtained. There was a unanimous opinion expressed that water neutralized with the hydrogen dioxid

was entirely free from any objectionable or even noticeable taste or odor, while bacterial tests demonstrated its freedom from micro-organisms. In view of the disagreeable and probably injurious qualities of water disinfected with calcium hypochlorite, in emergency outfits (Lister bags), and in view of the fact that troops avoid drinking this water, Fralick recommends its discontinuance.

Medicine and Surgery, St. Louis

January, 1918, **2**, No. 1

93 Tetany and Parathyroid Glands. W. F. Koch, Detroit.—p. 9.
94 Function of Suprarenal Glands. T. Tieken, Chicago.—p. 18.
95 Treatment of Certain Forms of Asthma with Ovarian Substance and Corpus Luteum. M. Fishberg, New York.—p. 26.
96 Bit of Hormonology with Practical Applications. E. A. Tracy, Boston.—p. 35.
97 Clinical Endocrinology in General Practice. H. R. Harrower, Los Angeles.—p. 41.
98 Treatment of Goiter with Quinin and Urea Injections. L. F. Watson, Chicago.—p. 49.
99 Syphilis of Kidney. H. A. Fowler, Washington, D. C.—p. 54.

Michigan State Medical Society Journal, Grand Rapids

February, 1918, **17**, No. 2

100 Fractures of Skull; Report of Cases. L. J. Dretzka, Detroit. —p. 47.
101 Future of Medicine. W. H. Smith, St. Clair.—p. 52.
102 Etiology of Thyroid Hyperplasia. B. N. Epler, Kalamazoo.—p. 56.
103 Tics or Habit Spasm. D. Inglis, Detroit.—p. 58.

Missouri State Medical Association Journal, St. Louis

February, 1918, **15**, No. 2

104 Congenital Constrictions of Gastro-Intestinal Tract. O. F. Bradford, Columbia.—p. 39.
105 Protein Indigestion in Infant. J. Zahorsky, St. Louis.—p. 46.
106 Use of Roentgen Ray on Gastro-Intestinal Tract of Children. J. Aull, Kansas City.—p. 48.
107 Fractures of Humerus. R. A. Woolsey, St. Louis.—p. 50.
108 Pupil—from Ophthalmologist's Standpoint. H. D. Lamb, St. Louis. —p. 52.
109 Tooth Pulp Stones and Their Relation to Tic Douloureux. F. W. Brownfield, Chicago.—p. 53.

Modern Hospital, St. Louis

February, 1918, **10**, No. 2

110 Transformation of Dwelling House into Hospital. E. F. Stevens, Boston.—p. 75.
111 Economy in Management of Small Hospitals. W. Morritt, Colorado Springs, Colo.—p. 79.
112 Saranac Lake General Hospital, Saranac Lake, N. Y. H. L. Walker, New York.—p. 82.
113 Children's Clearing Bureau of New York. F. C. Brooke, New York.—p. 85.
114 Economical Isolation Hospital. H. B. Dox, Peoria, Ill.—p. 88.
115 Occupations for Outpatients at Massachusetts General Hospital. J. F. Bresnahan, Boston.—p. 90.
116 Small Hospital with Up-To-Date Features. J. E. Broyles, Kalamazoo, Mich.—p. 92.
117 Standardization of Hospitals—Classes, VIII, IX, X, XI, XII and XIII. J. A. Hornsby and others.—p. 95.
118 Kistler Memorial Home for Nurses of Lock Haven Hospital. C. Happersett and L. H. Rush, Philadelphia.—p. 101.
119 Control of Exercise in Pulmonary Tuberculosis. H. L. Staring, Valmora, N. M.—p. 104.
120 How Small Hospital May Give High Grade Service. F. W. Shelton, Independence, Kan.—p. 112.
121 Individualty of Mentally Defective Persons. H. MacMurchy, Ontario, Canada.—p. 113.
122 Some Hindrances to Adoption of University Standard in Small Hospitals. C. M. Perry, Malden, Mass.—p. 117.

New Orleans Medical and Surgical Journal

February, **70**, No. 8

123 *Some Principles of Anthelmintic Medication. M. C. Hall, Detroit. —p. 637.
124 Fate of Ova of Ankylostoma Ingested by Larvae of Musca Domestica. P. Ł. Querens, New Orleans.—p. 653.
125 Excessive Feeding Cause of High Per Cent. of Infant Mortality. J. B. McMahon, De Ridder.—p. 655.
126 Chancre of Nipple. Carotid Body Tumor. Ruptured Rectus Femoris Muscle, Chronic Myositis. Dislocation of Sternal End of Clavicle (Forward). Fracture of Surgical Neck of Humerus. Dichloramin-T. Splints. I. Cohn, New Orleans.—p. 657.
127 Theory of Germ of Yellow Fever. E. M. Albers, Galveston, Texas. —p. 663.

123. **Principles of Anthelmintic Medication.**—Hall points out that anthelmintics are selective in their action; at least their dependable effectiveness is limited to certain sorts of worms. Certain kinds of worms require not only a suitable anthelmintic, but also suitable modes of medication, whereas other worms only require the simple administration of a single therapeutic dose of a suitable drug. Forms like the ascarids, which inhabit the small intestine and lie unattached in the lumen, are readily accessible to the ordinary types of anthelmintics. Forms like the hookworm, which attach for indefinite periods to the intestinal mucosa and occasionally detach and remain free in the lumen of the intestine for a time before attaching again, show a response to anthelmintics which may perhaps be correlated with this habit of attaching and detaching. Forms like the whipworm, located for the most part in the cecum are apparently not always exposed to the action of anthelmintics even when adequate doses of potent drugs are given. Fluidextracts or other preparations using alcohol as a solvent for active anthelmintic ingredients are frequently unsuitable as anthelmintics. These alcoholic preparations are often rapidly absorbed, largely in the stomach and duodenum, occasioning more or less irritation at the point of absorption and producing systemic effects of a more or less toxic nature. The considerable and rapid absorption leaves a comparatively small amount of drug available for actual anthelmintic action, and by the same token leaves the minimum of drug that could possibly be removed by purgation after exerting its anthelmintic effect. Anthelmintics of the supposedly insoluble type are not as insoluble as they are commonly supposed to be.

There are two factors to be considered in connection with the rate of absorption. One is the local effect of rapid absorption and the other is the systemic effect. When such toxic drugs as anthelmintics are rapidly absorbed, it means that the brunt of the irritation and insult due to the drug is borne by a rather limited section of the digestive tract; that a large amount of comparatively concentrated drug is taken in over the gastric and duodenal mucosa, and possibly by that of the upper jejunum. It would appear that what is desired in anthelmintic administration is, first, as little absorption as possible, and second, since there must be some absorption, probably a large amount as a rule, it is desirable to retard that absorption in order to distribute it over as large a surface of the gastro-intestinal mucosa as possible and to allow the maximum time for the body gradually to dispose of the drug by oxidation and elimination. Some anthelmintics do not need to be allowed "time to act" on the worms before purgatives are administered. The above proposition is stated tentatively. Preliminary fasting is important. Gastric stasis might occasionally interfere with the efficacy of anthelmintics. The passage of worms following anthelmintic treatment is a better indication for repeating or continuing treatment than for stopping treatment. Severe helminthiasis calls for caution in administering anthelmintics. While the majority of worms passed after anthelmintic treatment come away in the first twenty-four hours after treatment, there is a fairly large percentage which will commonly come away from one to six or seven days later.

New York Medical Journal

Feb. 9, 1918, **107**, No. 6

128 Vertigo. C. Graef, New York.—p. 241.
129 Wandering Dropsical Gallbladder; Report of Case. J. L. Amster, New York.—p. 244.
130 *Raynaud's Disease. G. Rubin, Chicago.—p. 246.
131 Kidney Infection as Result of Pyorrhea. F. S. Crockett, LaFayette, Ind.—p. 247.
132 Safeguards in Manufacture of Explosives. W. G. Hudson, New York.—p. 248.
133 *Blood Pressure in Head Injuries. H. M. Armitage, Chester, Pa. —p. 250.
134 Analysis of Seven Cases of Friedreich's Ataxia. M. Osnato, New York.—p. 255.

130. **Raynaud's Disease.**—Rubin cites a case treated by him with vaccines. The injections were made every fourth day, given subcutaneously and in varying locations in arms, thighs and back. A small Luer syringe with a twenty-four gage needle was used. At the eighth injection of the vaccine, at the instant the needle was plunged into the skin, at about the level of the sixth dorsal vertebra and about 2 inches to the right of the spinous processes, the skin blanched to almost

snow whiteness, extending to the left of the spinous processes; the appearance was almost symmetrical, except that the area to the left of the spinous processes was somewhat larger than that to the right. The whole area was about 10 cm. across and 7 or 8 cm. vertically. The patient felt a sharp stinging pain not experienced on previous occasions. The ischemia was still present when the patient left the office a half hour later. The following day the area assumed a dark purple hue and the patient complained of severe burning pain and being kept awake all night. It was then evident that the case was one of angioneurosis and from general indications it corresponded unmistakably to the Raynaud's symptom complex variety. With the exception of the site it was a classical textbook case. The sloughing of the tissues continued for about three weeks and it healed very slowly. The skin and subcutaneous structure, including muscle, were destroyed.

133. **Blood Pressure in Head Injuries.**—According to Armitage blood pressure readings are only of negative value in head injuries where compression of the brain with medullary involvement has not occurred. In severe fractures of the base with widespread hemorrhage, blood pressure readings are valueless. In all other fractures of the skull with compression and medullary involvement, blood pressure readings form one of our most important symptoms, but contrary to all teachings, Armitage believes the systolic pressure to be of no value whatever as a diagnostic measure in determining the degree of compression of the brain and aiding in the decision as to the advisability of an operation. These cases show conclusively that the pulse pressure is proportionately high in cases of traumatic compression of the brain and the more serious the compression the higher the pulse pressure until the last stages when vasomotor compensation begans to fail. They also prove that the pulse pressure ascends as the pulse rate descends in each case until finally the pulse pressure becomes greater than the pulse rate and when this has occurred compression has always been present. It would be folly, however, to wait deliberately for this phenomenon to occur before operating in cases in which a proportionately high pulse pressure was rising and the pulse rate falling. The choice whether or not a patient should be trephined must be made with a moderation of counsel and temperateness of judgment. Under such circumstances the final decision must always be formed from the study of the entire group of symptoms; the most important one is the frequent estimation of the pulse pressure in its relation to the pulse rate and systolic and diastolic pressures.

Oklahoma State Medical Association Journal, Muskogee

February, 1918, **11,** No. 2

135 Acidosis and Recent Methods of Demonstrating It. O. J. Walker, Oklahoma City.—p. 41.
136 Tonsillectomy by Modification of Sluder Technic. E. F. Stroud, Tulsa.—p. 51.
137 Acute Suppurative Otitis Media. W. A. Cook, Tulsa.—p. 54.
138 Iridocyclitis Due to Focal Infection from Tooth; Report of Case. L. M. Westfall, Oklahoma City.—p. 61.
139 Is the Middle Turbinate Bone Essential? L. C. Kuyrkendall, McAlester.—p. 65.
140 Medical Nomenclature. H. B. Gwin, Tulsa.—p. 67.

Ohio State Medical Journal, Columbus

February, 1918, **14,** No. 2

141 Local Infection as Causative Factor in Production of Duodenal and Gastric Ulcer. W. D. Haines, Cincinnati.—p. 77.
142 Classes for Conservation of Vision in City Public Schools. R. B. Irvin, Cleveland.—p. 81.
143 Care of Perineum During Second and Third Stages of Labor. J. P. Gardiner, Toledo.—p. 83.
144 Factors to Be Considered in Treatment of Pelvic Infections. L. G. Bowers, Dayton.—p. 85.
145 Interpretation of Wassermann Test. T. Zbinden, Toledo.—p. 87.
146 Some Contraindications for Certain Gynecologic Operations. M. J. Longsworth, Lima.—p. 90.
147 An Outline of Health Survey. J. A. Tobey.—p. 93.

Rhode Island Medical Journal, Providence

February, 1918, **2,** No. 2

148 Poliomyelitis, Anterior, Pathology, Symptoms, Indications and Treatment. W. B. Snow, New York.—p. 17.
149 Value of Speech Reading for Adult Deaf. M. A. Durfee, Providence.—p. 26.

Southwestern Medicine, El Paso, Texas

February, 1918, **2,** No. 2

150 Case of Mitral Stenosis and Left Recurrent Paralysis. M. P. Schuster, El Paso.—p. 1.
151 Value of Careful History in Treatment of Chronic Digestive Disorders and Necessity of Postoperative Medical Treatment. E. C. Prentiss, El Paso.—p. 10.
152 A Little Mexican Medicine. B. Smith, Douglas, Ariz.—p. 14.
153 *Anomaly in Location of Terminal Ileum; Report of Case. F. T. Wright, Douglas, Ariz.—p. 17.
154 Obscure Fevers of Infancy and Childhood. J. A. Rawlings, El Paso.—p. 19.
155 Thrombosis of Mesentery; Report of Case. H. A. Miller, Clovis, N. M.—p. 25.

153. **Anomaly in Location of Terminal Ileum.**—In a man who had died following an operation for what had been diagnosed as chronic appendicitis, the following arrangement of the cecum and terminal portion of the ileum was found by Wright. The cecum was located in its normal place in the abdominal cavity. It was, however, as though rotated on its longitudinal axis about 180 degrees, so that the base of the appendix presented on the anterior and external aspect instead of on the inner and posterior. The ileum joined the cecum on its outer side, and, instead of running thence toward the middle of the abdominal cavity, ran directly outward and a little downward to the external abdominal wall, a distance of perhaps 3 inches. This portion of the ileum was provided with a mesentery which became shorter as the abdominal wall was approached and finally disappeared. When the ileum reached the abdominal wall it disappeared behind the peritoneal layer, and ran directly downward for about 4 inches, completely covered all the way with peritoneum, and intimately adherent to the subjacent tissues. It then emerged from behind the peritoneum, turned directly inward and upward, acquired a mesentery, and became, so to speak, its usual part of the normal abdominal contents. There was no indication that this condition was the result of any inflammatory process. This retroperitoneal portion of the ileum simply came over to the abdominal wall, lost its mesentery, disappeared in a tunnel beneath the peritoneum, emerged, acquired a mesentery, and proceeded back into the abdominal cavity where it belonged. The retroperitoneal portion was of decidedly smaller caliber than the adjacent portions.

FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

British Journal of Children's Diseases, London

October-December, 1917, **14,** No. 166-168

1 Ten Years' Experience of Ringworm in Public Elementary Schools. J. Priestley.—p. 241.
2 *Mental Deficiency and Binet-Simon Tests. J. Priestley.—p. 250.
3 *Cervical Glandular Enlargement in Children, as Evidence of Infection. E. B. Gunson.—p. 255.
4 Infantile Paralysis. S. G. Dixon.—p. 260.
5 Two Cases of Meningococcal Infection: Cultivation of Meningococcus from Serum of Vesicle in One of the Cases. A. Netter, M. Salanier and Blanchier.—p. 264.
6 Mongolism Associated with Congenital Cataract. F. P. Weber. —p. 267.
7 Congenital Heart Disease in Mentally Defective Child, with Negroid Mongoloid Facies. F. P. Weber.—p. 269.
8 Congenital Hirsuties in Child. F. P. Weber.—p. 272.
9 Case of Congenital Umbilical Hernia, Ectopia Vesicae and Imperforate Anus. F. C. Pybus.—p. 274.

2. **Mental Deficiency and Binet-Simon Test.**—According to Priestley the Binet-Simon tests have a value as a means of grading mentality especially as a rough-and-ready way of checking from a slightly different angle the opinion of the child's teacher. But, Priestley says, he never would be disposed to press the Binet-Simon results against the considered judgment of an experienced teacher who had had the child under observation for some months. The value of the tests as an aid in detecting mental deficiency is much more open to doubt. The tests certainly afford convenient standardized openings for conversation, during which one can observe the child's method of mental response, and the method of answering is generally a good deal more illuminating than the correctness or incorrectness of particular answers. So far they are useful, but as to considering every child defective who has a mentality three years behind its nominal age, that

would be a highly dangerous rule, and is out of the question. Priestley cannot recall a single case in which the Binet-Simon tests helped him to decide when he was in doubt before; the tests are ineffectual in cases in which they are not superfluous.

3. **Glandular Enlargement as Evidence of Infection.**—The symptoms presented by the adolescent patients examined by Gunson with symptoms suggesting cardiac disease, but who presented no signs of such disease or of disease in other symptoms, apart from the fauces were chiefly lassitude, exhaustion and breathlessness on slight exertion. In the majority of the cases no history of immediately preceding infection was obtained and the children were frequently brought to the hospital because the mother considered that there was something wrong with the child. The chief abnormal signs presented by many of these patients were slight or moderate enlargement of the upper deep cervical glands, associated with tonsillar enlargement in many cases; in others with faucial injection only. Such children not infrequently were poorly developed, with deficient expansion of the upper chest, but no demonstrable signs of pulmonary disease were present.

An investigation into the state of the cervical glands during the course of scarlet fever revealed several points of interest. One hundred consecutive children were observed throughout their stay in the hospital. Ninety-seven cases were mild, three cases were septic. Of the mild cases all patients recovered; one of the septic patients died on the thirty-fourth day. Ninety-one cases on admission presented enlargement of the tonsils and injection of the fauces. In nine cases there was no enlargement of the tonsils and in three cases the fauces were apparently normal. One patient, in whom tonsillectomy had been performed a few weeks before admission, had injected fauces; in this patient the tonsillar glands were enlarged.

Gunson says that while glandular enlargement is evidence of an infective process situated in the lymphoid tissue specifically drained by such glands, simple chronic glandular enlargement in young children is associated with malnutrition and alimentary and respiratory disorders. When the glandular enlargement persists into adolescence, or develops, these patients suffer from apathy, exhaustion, and dyspnea on slight exertion. The symptoms are sufficiently severe to suggest cardiac disease, which careful examination fails to reveal.

British Journal of Tuberculosis, London

January, 1918, **12,** No. 1

10 Tuberculosis and War: Prevention is Better than Cure. L. Cobbett.—p. 16.
11 Tuberculous Army Recruit. P. J. Gaffikin.—p. 20.
12 Tuberculosis and Ministry of Health. W. H. Dickinson.—p. 22.
13 Future of Antituberculosis Campaign. T. E. Nuttall.—p. 26.

Dublin Journal of Medical Science

January, 1918, **145,** No. 553

14 Acute Troubles of Bones. J. S. McArdle.—p. 1.
15 Some Preliminary Points in Diagnosis of Amebic Dysentery. J. Speares.—p. 6.
16 Complications of Scarlatina. W. S. Boyd.—p. 12.

Journal of Laryngology, Rhinology and Otology, London

January, 1918, **33,** No. 1

17 Value of Endorhinoscopic Examination. M. Yearsley.—p. 1.
18 Primary Tuberculosis of Faucial Tonsils in Children. A. P. Mitchel.—p. 8. To be continued.

Lancet, London

Jan. 19, 1918, **1,** No. 4925

19 Cerebrospinal Fever in Royal Navy. H. D. Rolleston.—p. 87.
20 Grouping of Meningococci into Types. P. Fildes and S. L. Baker.—p. 92.
21 *Study of P. U. O. (Pyrexia of Unknown Origin). W. Pasteur and B. Hudson.—p. 94.
22 Localization and Removal of Foreign Bodies by Combined Method of Radioscopy and Operation. R. Knox.—p. 96.
23 Treatment of Staphylococcal Infections by Stannoxyl, Furunculosis and Acne. A. Compton.—p. 99.
24 Case of Splenomegaly Treated by Splenectomy. G. R. Footner and R. G. Archibald.—p. 101.
25 Muscular Rheumatism; Its Diagnosis and Treatment by Physical Means. F. Radcliffe.—p. 102.
26 Bomb Wound of Abdomen. D. P. D. Wilkie.—p. 103.
27 Case of Threatening Sepsis of Knee-Joint Aborted by Injection of Flavine. W. H. Hillyer.—p. 103.
28 Case of Cutaneous Anthrax in Man Presenting Multiple Lesions. W. T. G. Davidson.—p. 104.

21. **Study of Pyrexia of Unknown Origin.**—Pasteur and Hudson suggest that the featureless aspect of so many cases diagnosed as P. U. O. may be just because they are the clinical expression of smoldering bacterial infections which have failed to become fully alight (active) and thereby more individualized and recognizable in their outward expression.

Archives de Médecine des Enfants, Paris

September, 1917, **20,** No. 9

29 *Pneumococcus Invasion in Course of Meningococcus Meningitis. A. Netter and M. Salanier.—p. 449.
30 Hair Ball in Stomach of Girl of Thirteen. J. S. Dauriac.—p. 465; Ditto in Girl of Four. A. Broca.—p. 468.
31 Primary Cancer of Liver in Girl of Eleven. De Saussine and Others.—p. 472.
32 Recent Publications on Latent Otitis in Infants. J. Comby.—p. 476.

29. **Secondary Pneumococcus Infection in Meningococcus Meningitis.**—Netter and Salanier have encountered this association in five children among twenty-nine with epidemic meningitis. They have learned of other cases and here analyze a total of 22, with fatal outcome in all but 3 cases. The superposed infection usually developed when the meningococcus seemed to be under control. The pneumococci evidently penetrate from the nasopharynx to the meninges, and they seem to be able to destroy the meningococci already installed. The proper antimeningococcus serum is indicated, and, equally important, antipneumococcus serum should be given when the pneumococcus infection supplants the other. The children who recovered were those who had been given preventive injections of the antipneumococcus serum.

Archives de Médecine et de Pharmacie Militaires, Paris

June, 1917, **67,** No. 6

33 *Chronic War Osteomyelitis. H. L. Rocher.—p. 717.
34 The Surgical Neurologic Center. C. Villandre.—p. 739.
35 *Crippling of the Hands. Daussat.—p. 763.
36 Fractures of the Crest of the Ilium. V. Planson.—p. 776.
37 *Diphtheria among the Troops. Labit.—p. 779.
38 *Cerebrospinal Meningitis. G. Laroche.—p. 788.
39 The Trapezius Sign in Pulmonary Tuberculosis. M. Loeper and H. Codet.—p. 812.
40 *Test Glycemia. M. Loeper and G. Verpy.—p. 817.
41 Operating and Roentgen Table. A. M. Fabre.—p. 824.
42 Frame for Suspension and Extension of Fractured Limbs. L. Bois.—p. 831.
43 *Test for Occult Blood. Thévenon and Rolland.—p. 850.

33. **Chronic Osteomyelitis.**—Rocher discusses in turn the various conditions liable to be encountered with osteomyelitis early or later after a war wound, and the measures to be applied. The nerve and other possible complications are also reviewed. When the callus is painful, there is great probability that there is latent infection. There is no specific treatment for osteomyelitis. Healing depends not only on a perfect and complete operation but also on the care and vigilance with which the focus is tended until definite healing. In smaller bones, like the ulna and fibula, cicatrization may be complete in two months, but with the femur, tibia and humerus three or four months may be required for this. Bone tissue is very slow in regenerating and seems to have the least power of defense against infection, hence healing is slow and reinfection facile. The dressings after operative treatment of osteomyelitis should be changed only by physicians familiar with bone surgery or nurses trained in the required care and skill. Inexpert change of dressings may undo all that has been accomplished. The chronic fistulas so common in the hospitals are due not only to incomplete and defective operative intervention but also to inexpert after-care.

35. **Crippled Hands.**—Daussat analyzes his experience with 2,750 wounded, of whom 50 per cent. had been wounded in the arms or hands. He discusses how the various degrees of crippling incapacity can be enumerated and classified. A nomenclature is proposed with graphic abbrevations both for anatomic and functional disabilities.

37. **Prophylaxis of Diphtheria among the Troops.**—Labit reports the results of treatment of bacilli carriers among the troops of the "ninth region." Diphtheria has always been endemic in this section, and at the outbreak of the war the troops gathering there soon developed cases. When four laboratories were installed with movable isolation barracks, the infection was brought under better control and the number of cases dropped from 1,450 in 1915 to 463 in 1916 and 110 in the first six months of 1917. The deaths totaled 26, 4 and 2 during these years. The proportion of carriers in the environment of cases of diphtheria averaged 28.9 per cent. but frequently surpassed 50 per cent. He found it impossible in the same building with cases of the disease to free the carriers effectually of bacilli. He consequently rented quarters at quite a distance from the barracks, and the carriers were kept there until three examinations at a week's interval gave negative findings. At Poitiers the men thus isolated were in a building with large gardens which they cultivated for their own profit. In some of the barracks, existing separate buildings were used; and houses where there had been cases of diphtheria were sometimes used for isolation of carriers. The same measures were applied to civilians as well as to the soldiers. Contaminated rooms are left open to the sun and air to the very longest period it is possible to keep them unused. In the diphtheria hospitals, special rooms are set apart for the examination of those entering, for those with mild diphtheria, for the grave cases, for convalescent carriers, and for the convalescent noncarriers. He sends to the hospital for bacteriologic examination every soldier with sore throat, and every man leaving for the front is so examined. He keeps back those with suspicious findings. Despite these precautions, men are occasionally set back from the front with diphtheria, or carriers, as a man may become a carrier at any moment when occasion presents. He found nineteen carriers among the nurses and male attendants at one surgical hospital unit when a case of diphtheria had developed. He regards the prompt sending to the hospital for bacteriologic examination of every man with sore throat of any kind as a most important element of the prophylaxis. Only when the physicians in the section cooperated effectually in this were the desired results obtained in larger measure. He does not mention the technic used for sterilizing the throat, but states that the inveterate chronic carriers impossible to free from their bacilli were kept in the hospitals, some staying there for several months.

38. **Epidemic Meningitis.**—Laroche reviews the experiences that have been published to date regarding the application of local serotherapy directly into the lateral ventricle since Cushing and Slaven ventured this in two cases in 1908. He then reports two cases from his own practice with recovery of one of the two young men. He suggests that the best technic for direct intraventricular injection of the antiserum may be learned on children as the fontanel facilitates puncture of the ventricle. One always hesitates before an operation on the adult skull with the man so sick as with meningitis. Laroche regards Cushing's temporal flap method as complicated and useless. He and Ramond trephine at a point 3 cm. below the median line and 3 cm. in front of the bregma. The needle is one designed for lumbar puncture, with a stout guide. It is pushed in for 4 or 5 cm., the tip pointed toward the opposite ear. If no fluid emerges, he withdraws the needle entirely and introduces it in another direction. Successive punctures do no harm to the brain, he reiterates, but if the tip were worked to and fro or around in the depths, the white fibers of the brain would be lacerated. The danger from puncture of the ventricle is minimal; the point selected avoids large arteries or the sinus. Some arteriole or small vein might be injured, of course; it might be well to use a needle with a rather blunt tip which would push the arteriole out of the way instead of cutting it. The amount of antiserum injected should not be over two-thirds of the amount of fluid withdrawn. A preliminary small injection by Besredka's technic serves to ward off anaphylaxis. Indications of sensitization to the serum call for great caution. If antiserum precipitins are found in the cerebrospinal fluid, it might be wise to vaccinate the patient according to Ramond's method. He mixes in vitro 6 c.c. of the antimeningococcus serum with 3 c.c. of the tyndallized cerebrospinal fluid, and injects the whole subcutaneously two days before he resumes the antiserum treatment. The danger of sensitization is another argument in favor of early trephining puncture before phenomena of sensitization can develop.

40. **Test Glycemia.**—Loeper and Verpy state that in epinephrin we have a means of estimating the power of the liver to transform glycogen into glucose just as we can test with alimentary glycosuria its power of forming glycogen. With epinephrin we can induce as it were an alimentary glycemia. They inject into the thigh 1 mg. of active epinephrin. In half an hour the blood shows, on an average, 0.73 gm.; in one hour 0.43 gm., and in three hours 0.24 gm. In a normal person there is an increase of about 0.40 gm. by the end of the first hour. This is the standard taken for the test. In twenty-two men with acute or chronic liver disease, the epinephrin glycemia was found exaggerated in cases of acute irritation of the liver and notably subnormal in cases of defective liver functioning. The disappearance of the glycemia in the course of liver disease is a sign of aggravation, and may indicate a speedily fatal outcome. If the epinephrin glycemia varies in the course of a stomach, bowel or nervous disease, this shows that the liver functions are becoming depressed also.

43. **Test for Blood in Body Fluids and Stools.**—The test described is based on the change of tint of pyramidon when brought in contact with oxidizing substances. The reagents are (1) a solution of 2.5 gm. pyramidon in 50 c.c. of alcohol (90 degrees), and (2) a solution of 1 c.c. of crystalline acetic acid in 2 c.c. of distilled water. To 3 or 4 c.c. of urine are added the same volume of the pyramidon solution and six or eight drops of the acetic acid solution. To this mixture are now added five or six drops of hydrogen dioxid at 12 volumes. The tint changes instantaneously to violet if there is much blood present, and even if there are only traces the reaction occurs within fifteen minutes, the bluish violet tint reaching its height and then disappearing. In examining feces, a small lump is triturated with 3 or 4 c.c. of distilled water and filtered. To the filtrate are then added 3 or 4 c.c. of the acetic-pyramidon reagent and then six drops of the hydrogen dioxid, and the whole is agitated. The tint changes to a bluish violet in proportion to the amount of blood present. Thévenon and Rolland state that they have applied this test to various body fluids and stools, with parallel phenolphthalein tests according to Meyer's technic. The tests gave invariably the same results. The pyramidon test is thus equally sensitive while it is simpler, the reagents keep well, and the test can be applied indiscriminately to various body fluids.

Le Nourrisson, Paris

September, 1917, 5, No. 5

44 Functional Disturbances with Digestive Disease in Infants. A. B. Marfan.—p. 257.
45 *Infant Welfare Work in Belgium. R. van Roy.—p. 267.
46 Calculi in Prepuce of Small Child. Ramaroni.—p. 270.
47 *Modification of Cow's Milk for Infants. A. B. Marfan.—p. 272.

45. **Welfare Work for Infants in Belgium.**—Van Roy states that in no other country is the system of infant consultations so extensively applied as in Belgium. He is convinced, he says, that four-fifths of the pediatrists of Belgium have an office for giving free advice to infants. They usually have two or three rooms equipped for the purpose, apart from their regular office, a waiting room, the room in which the children are undressed and weighed and the consulting room. Each infant has its card, and a nurse helps to weigh the children. This is usually some charitable volunteer. All the hospitals have these free consultations. At Antwerp the "Associated Charities" has five in different parts of the city and prospective mothers are visited and looked after. Milk and gruels are distributed, and the infant mortality of Antwerp is exceptionally low.

47. **Modification of Cow's Milk for Infant Feeding.**—Marfan gives the history of efforts in this line by various pediatrists in different countries. The practice he has found most advantageous is to give milk half and half with boiled water

sweetened to 10 per cent. the first days, and two-thirds milk to one-third sweetened water during the first four months, and after this three-fourths to one-fourth. If the child is thriving, then pure milk sweetened a little can be given. If digestive disturbance develops, he returns to the one-fourth or one-third mixture. When these modifications are well mixed and well sterilized, most healthy infants digest them perfectly. Constipation is less than with pure sterilized milk; the stools are softer and yellow, although not quite like those of the breast-fed. Vomiting is as rare as diarrhea. The children do not gain in weight as fast as the breast-fed, but the difference is not great, and it is soon made up, thanks to the soundness of the digestive tract, when the time comes for the pure milk. The water used is not sweetened at all during the first week; after that it is sweetened with saccharose. The water is boiled for two or three minutes and the sweetening added while it is boiling. If the sterilization is done in a water bath, the milk and the sweetened boiled water can be mixed beforehand. He prefers to have only half the daily quantity of the sweetened water prepared at one time.

Presse Médicale, Paris

Dec. 27, 1917, **25**, No. 72

48 *Suture after Suprapubic Prostatectomy. V. Pauchet.—p. 729.
49 *The Oculocardiac Reflex. A. Mougeot and Duverger.—p. 730.
50 Transportation with Fractured Femur. E. Pouliquen.—p. 732.

48. **Closure of the Suprapubic Wound after Prostatectomy.**—Pauchet describes his technic with which complete healing within twenty days can almost be guaranteed. A Marion drain is left in the wound for nine days. Then a retention catheter diverts the urine through the urethra for three days. Then the wound is sutured, and the retention catheter introduced again and left for eight days. The twenty-first day this catheter is removed and also the suture threads. He takes two U catgut sutures in the bladder wall, enclosing both lips of the wound but not entering the mucous membrane lining of the bladder. After these are drawn tight and tied separately, he passes three silkworm gut sutures. The needle enters the rectus muscle, skips twice through the outer layer of the bladder wall, and then passes through the rectus muscle on the other side. Then each end of the silkworm gut is crossed back and brought out through the skin on the side of the incision where it first entered. One such suture is taken directly across the suture in the bladder wall, and the two others just above and below this. The skin is coaptated with clips and a roll of gauze is laid over this. Then the ends of the three figure 8 sutures are tied tight separately over the gauze.

The various steps of the suture are illustrated. The urine clears up spontaneously afterward or after rinsing a few times with a silver salt. If there is a diverticulum in the bladder there may be slight pyuria for some time. Removal of the hypertrophied prostate is often surprisingly simple and easy, but sometimes it is difficult to locate the exact plane of cleavage on account of multiple adenomas, or inflammation in and around the prostate. Considerable skill is necessary in such cases to clear out all the débris of the prostate and leave a cavity smooth to the touch. Unless this is done, healing may be delayed. It is difficult to carry through a long series of prostatectomies without such mishaps occasionally. Pauchet has done 477 prostatectomies and has had no death in his last series of 40, although he has widened the indications and operates now in even very grave cases. Almost the only contraindications he now accepts are the clearly insufficient heart (shortness of breath, edema) or much altered kidneys. When there is the least doubt as to the resisting powers, the functional capacity of the kidneys or the asepsis of the urine, he does the operation at two sittings, and the prognosis has been singularly improved since he has been doing this. Between the two steps of the operation the patient leads his usual life, goes out of doors, but restricts his diet to fruits, vegetables, rice, potatoes and butter, avoiding nitrogenous foods as much as possible. After he has been at home for a few weeks or months, and the surgeon estimates that he has regained sufficient resisting powers, then the date of the secondary prostatectomy can be fixed.

49. **Bradycardia and the Oculocardiac Reflex.**—Mougeot and Duverger discuss the paradoxic behavior of the oculocardiac reflex in the wounded. In sixty cases of total sinusal vagotonic bradycardia of nontraumatic origin, the reflex was normal or exaggerated, with one exception. In this exceptional case there was no reaction to amyl nitrite. Their experience has shown further that bradycardia following an accident to the eye, skull or brain is always total, sinusal, and of vagotonic origin . Among 190 men wounded in the eyes, five developed bradycardia, probably from the concussion. The mechanical influence of the hypertension of the cerebrospinal fluid in cases of concussion is sufficient to explain the bradycardia and the abolition of the oculocardiac reflex in such cases. If the oculocardiac reflex appears again after trephining has restored the tension to approximately normal, then the disturbances are probably only functional and speedy recovery may be counted on. But when the oculocardiac reflex is persistingly abolished when tested at once after the evacuating puncture, we must accept some lesion, probably in the anastomosing fibers discovered by Ramon y Cajal between the descending sensory root of the trigeminal nerve and the original intrabulbar fibers of the pneumogastric nerve. This was demonstrated in one of the cases reported.

Correspondenz-Blatt für Schweizer Aerzte, Basel

Dec. 22, 1917, **47**, No. 51

51 *The Defensive Ferments. E. Abderhalden.—p. 1745.
52 *Influence on the Heart of Chronic Action of Camphor. H. E. Sigerist.—p. 1748; T. Zangger.—p. 1752.
53 The Cremaster Reflex with Sciatica. A. Rodella.—p. 1753.
54 Exhaust Gas Garage Poisoning. H. v. Meyenburg.—p. 1761.

51. **Present Status of the Protective Ferments and the Abderhalden Reaction.**—Abderhalden declares that thousands of careful tests have confirmed the diagnostic importance of the protective ferments found in the blood after introduction of foreign cell substance. Each kind of cell has certain special functions and hence a special structure, and certain elements in each kind of cell are foreign to other kinds of cells; besides this, each unsplit-up cell getting into the blood is a foreign substance. Ferments are produced to get rid of these cell-foreign and blood-foreign substances, and these protective ferments play an important rôle. We know, for example, that the fibrin in the alveoli of the lung in pneumonia is disintegrated and prepared for adsorption by ferment action, and stout adhesions disappear by the same action. In addition to the polariscope and dialysis methods for demonstration of these protective ferments, the stain or metal method of investigation has been tried. The organ tissue under examination is treated with a stain or with iron—which is not found in normal blood plasma. If iron is found in the blood serum after it has been in contact with organ tissue artificially impregnated with iron, then the assumption follows that the iron has been set free by the action of some ferment. This is the basis of Kottmann's test for pregnancy. He treats protein with iron. Under the influence of ferment action the iron passes into the fluid. When placenta, ovary or testicle tissue is used for the test, the serum of pregnant women causes the appearance of the iron in the fluid while ordinary serum does not. Abderhalden comments on this that it is merely a modification of the previous methods for demonstrating the protective ferments; he says that it is not, as claimed, a "new pregnancy reaction." [In his communication on the subject in the *Correspondenz-Blatt für Schweizer Aerzte*, 1917, **47**, 377, Kottmann stated that patents had been applied for in several countries for this "iron placenta" as a test for pregnancy, and for the method of "iron organs" in general.] On the other hand, Abderhalden says that P. Hirsch's interferometer is based on a new principle for demonstrating the protective ferments, and that it seems to be very promising. It confirms anew the specificity of the protective ferments. [Hirsch's article "Die interferometrische Methode zum Studium der Abwehrfermente" appeared in *Fermentforschung*, 1914, **1**, 33.]

Abderhalden adds that further progress has been realized recently by F. Pregl and de Crinis by their research on the refracting powers of the serum before and after it has been

acting on organ tissue. They found that the action of the protective ferments could be clearly and decidedly recognized with the refractometer. They worked out a technic for this which requires only a minimal amount of serum, and the method thus becomes, Abderhalden remarks, "a micro-Abderhalden reaction." A few drops of serum suffice, and they can be used for different proteins. "If this method answers its promise, it is bound to be the technic for the future in all such research." Their communication on the subject is credited to *Fermentforschung*, 1917, **2**, 58. [Both Abderhalden and Kottmann have suggested that active immunization might be realized by administration of serums rich in defensive ferments in treatment of cancer, etc., and each mentions proprietary preparations designed for this purpose.]

52. **Action of Camphor on the Heart.**—Sigerist reports that the long continued administration of camphor to rabbits did not seem to impair in any way the functioning or the structure of the heart, but rather to increase its functional capacity. But it did not render the heart more resistant to phosphorus poisoning or to diphtheria toxin, and did not aid in throwing off the effect of either.

Zangger relates that he has found small doses of camphor very useful in keeping up the tone of the heart with chronic myocarditis. During the acute phases, digitalis or other tonics are needed, but when the heart settled down to a chronic course, ten or fifteen drops of the usual spirit of camphor, two or three times a day for months at a time, seemed to aid materially in keeping up the balance of the heart. He has thus treated more than 100 patients, over 65 with chronic myocarditis, and describes some of the typical cases in detail. He gave the camphor on sugar or in water.

Gazzetta degli Ospedali e delle Cliniche, Milan

Dec. 9, 1917, **38**, No. 98

55 *Plastic Operation for Wounds of the Superior Longitudinal Sinus. O. Ortali.—p. 1293.

Dec. 20, 1917, **38**, No. 101

56 Cholecystotomy in Typhoid Bacilli Carrier. N. Federici.—p. 1330.

Dec. 23, 1917, **38**, No. 102

57 *Electric Reeducation of the Muscles. L. de Lisi.—p. 1340.

Dec. 27, 1917, **38**, No. 103

58 Paratyphoid Genito-Urinary Lesions. F. Bergolli.—p. 1355.

55. **Plastic Operation on Superior Longitudinal Sinus.**—Ortali gives an illustrated description of a war wound involving the vertex in which he twisted a pedunculated flap from the epicranial aponeurosis around to cover the breach. It proved effectual in staunching the hemorrhage while not obstructing the permeability of the vessels. The man died later and the necropsy showed that the flap had answered its purpose perfectly.

57. **Motor Reeducation.**—De Lisi's method consists in electric stimulation of the antagonist muscles in treatment of contracture and paralysis after war wounds. He uses the faradic current with an interrupting metronome to break the current rhythmically, the whole arranged so that the patient can walk to and fro in a certain space. The aim is to have him step synchronously with the metronome, so that the current reaches the group of muscles and nerves just at the moment when they start to contract and the antagonists start their contrary action. The patient soon learns to step with the proper rhythm, guided by the metronome. The sensation induced by the current aids in giving confidence, while the metronome gives a feeling of reliance. The method is proving very effectual in his service for nervous affections in the wounded.

Pediatria, Naples

January, 1918, **26**, No. 1

59 *Cholesterol in the Blood. S. di Stefano.—p. 1.
60 *Aspect of the Abdomen in Infants. A. Gismondi.—p. 7.
61 Streptothrix Meningitis. R. K. Marinucci.—p. 11.
62 Present Status of Leukemia. C. Martelli.—p. 15.

59. **The Cholesterol Content of the Blood Serum with the Exudative Diathesis.**—Di Stefano cites recent research which apparently fixes the normal range of the cholesterol content as from 1.40 to 1.80 per cent. in the blood serum of adults. In thirteen healthy infants the range was from 0.80 to 1; after the sixteenth month it approximated the adult figure. He found in twenty children with the exudative diathesis, from 4 months to 7 years old, that in twelve the cholesterol content was abnormally small; in four it was within normal range, and in four was slightly above it. He suggests that the abnormally low cholesterol content may be a factor in the inflammatory reactions in the skin, mucous membranes and lymph glands which form part of the clinical picture of the exudative diathesis.

60. **Abdominal Sign of Undernourishment in Infants.**—Gismondi has noticed that infants getting proper and adequate nourishment usually present on each side of the abdomen, low down, a slight protuberance. This is probably due to the relaxed condition of the abdominal wall in very young infants which allows it to bulge when a filled loop of intestine presses against it. This little bulging is constantly observed in young infants thriving on proper nourishment. The absence of the bulging therefore is an early sign that the child is not getting enough food. Distention of the bowel with gas induces a more uniform and diffuse bulging of the abdominal wall. As the abdominal wall grows more elastic, this bulging disappears, usually at the second or third month. Its absence before this may be due to diarrhea, to pylorospasm or stenosis, habitual vomiting or to inability of the child to suck properly. When these can be excluded, insufficient nourishment must be incriminated.

Policlinico, Rome

Jan. 6, 1918, **25**, No. 1

63 The Present Tasks of the Medical Clinic. V. Ascoli.—p. 3. To be continued.
64 *Drainage by the Femoral Route for Peritonitis after War Wounds of the Groin. S. P. Allegra.—p. 7.
65 *Tar Treatment of Wounds. Mantovani and Manzini.—p. 8.
66 Retroperitoneal Dermoid Cyst. R. Vigliani.—p. 9.

January, **25**, Medical Section No. 1

67 *Tumors of the Temporal Lobe. P. Ciuffini.—p. 1. To be continued.
68 *Neurotrophic Edema. R. Carnelli.—p. 12.
69 Tardy Localized Tetanus. B. Masci.—p. 24.

December, 1917, **24**, Surgical Section No. 12

70 *Abdominal Wounds. U. Stoppato.—p. 473.
71 *Hypertrophied Prostate. R. Cinaglia.—p. 485.
72 Experimental Lesions of the Pituitary. A. Chiasserini.—p. 505. Continuation.

64. **Drainage of Peritoneum through the Femoral Route.**—Allegra states that in eight cases of war wounds of the inguinal regions he found it simple and effectual to drain the peritoneum by way of the iliopectineal fossa. A buttonhole in the peritoneum is all that is necessary, as the drainage is thus provided at the lowest point. He drained through a No. 28 Nélaton catheter, wrapped in gauze, keeping the dressings moist. The iliac fascia has to be incised but the psoas and iliac muscles are just pushed to one side.

65. **Tar as First Dressing for Wounds.**—Vegetable tar was applied in fifty cases of war wounds, and although it does not pretend to effectually sterilize the wound, yet it seemed to modify the proliferation of the germs without impairing the vitality of the tissues or impeding leukocyte action.

67. **Tumors in the Temporal Lobe.**—Ciuffini gives the clinical and necropsy study of a case of sarcoma in the right temporal lobe of a man of about 30. It had been causing symptoms for nearly four years. The article is continued.

68. **Neurotrophic Edema.**—Carnelli accepts a hysteric element in the case of hard edema described. It covered the entire front of the trunk and neck like a sleeveless sweater, with two patches on the cheeks. The entire right side, besides, showed anesthesia. The patient was a soldier of 40, invalided home. The man had a history of measles, malaria and cholera. The edema developed almost all at once and shows a tendency to a blue tint, suggesting Charcot's *œdème bleu des hystériques*. It is symmetrical and is accompanied by hemianesthesia, lateral hemianopsia and other nervous disturbances, including recurring aphonia.

70. **Preoperative and Postoperative Treatment of Abdominal Wounds.**—Stoppato emphasizes that the treatment of abdominal wounds is essentially medical-surgical, not sur-

gical alone. It would be a great advantage if men wounded in the abdomen could be carried on the litters in a semiseated position when first picked up. General chilliness, cold extremities and nose, and extreme thirst are among the symptoms of shock. Besides camphor, epinephrin and saline, he has found very useful the application of heat in the form of a frame, fitted with six electric bulbs, that is placed over the body. No fluids should be allowed by the mouth. It may be necessary to continue this treatment of shock for one or two hours, but the stimulants must not be given too freely or they will have the reverse of the desired effect. During the operation it may be found useful to keep up the saline infusion all the time. The condition of the circulation should be investigated anew after the operation before the man is moved.

71. **Hypertrophy of the Prostate.**—Cinaglia advocates palliative measures to the extremest limits, moderation in eating and drinking, avoiding long trips in trains and vehicles, horseback riding, and everything else liable to induce congestion in the prostate. No alcohol, no chilling should be allowed, and the bowels should be kept loose. The bladder should be emptied frequently, not allowing the urine to collect and distend the walls, and the functions of the skin should be stimulated with tepid baths, douche, rubbing and massage. Potassium iodid should be given internally for months or a year. Under strict hygiene it may be possible to ward off further trouble, and even if "catheter life" becomes indispensable, this managed properly may keep the man in the best of health for years. Guyon says it can be kept up for ten or twenty years. If operative treatment is unavoidable, the technic indicated by the special indications should be selected, but he warns that prostatectomy should not be attempted if there is severe purulent cystitis. The bladder can be opened and drained, but the temptation to remove the prostate should be controlled until the cystitis has healed. He yielded to the temptation in one case and the patient speedily succumbed to pelvicellulitis, thrombophlebitis and sepsis which followed the prostatectomy done in a field of purulent cystitis. Cinaglia reviews the various methods of treating the enlarged prostate that have been devised, listing fourteen different procedures besides prostatectomy proper.

Riforma Medica, Naples

Dec. 15, 1917, **33,** No. 50

73 *The Blood Pressure. A. Fulchiero.—p. 1153.
74 *Spasmophiliac Neurasthenia. A. Campani.—p. 1156.

Dec. 22, 1917, **33,** No. 51

75 *Ankylosis of the Elbow. G. Ceccarelli.—p. 1173.
76 *Primary Tumors of Peripheral Nerves. A. Tomiselli.—p. 1180.

73. **The Arterial Pressure.**—Fulchiero refuses to admit that the maximal arterial pressure has any definite significance in itself. Persons with the same maximal pressure may be in widely different conditions as regards the dynamics of their circulation. The minimal pressure, on the other hand, considered in relation to the duration of the heart cycle is an index of the sum total of the peripheral resistance to the circulation. This is what regulates the work of the myocardium, as it has to adapt itself to the resistance it encounters. He adds that the differential pressure bears no proportional relation to the volume of the systolic wave, but knowledge of the elements constituting the differential pressure permits an estimation of the individual conditions in the circulation, as he explains.

74. **Spasmophiliac Neurasthenia.**—Campani has encountered a number of cases of neurasthenia in persons who in youth were inclined to spasmophilia and sluggish metabolism. In twenty such cases the urine was milky, a pseudophosphaturia, but albuminuria was never noted. There was always a special susceptibility to external influences, especially the atmospheric, entailing vasomotor disturbance which in turn induced congestion in internal organs, pains in the joints, and cramps, chronic constipation alternating with diarrhea. The reduction in the acidity of the urine permits the precipitation of the phosphates and carbonates. Campani is inclined to regard the whole as the manifestation of a special state of weakness on the part of the nervous system, probably of sexual origin. All stimulants, caffein, alcohol, belladonna, etc., do direct harm. Purges also aggravate the nervous dyspeptic symptoms when their direct effect is past. Sodium salicylate may relieve joint and rheumatic symptoms. Sodium bromid, in the dose of 3 gm. at evening, is decidedly useful during phases of hyperesthesia, spasms and insomnia. Sexual abstention is of little or no advantage, but abuse is injurious. Preparations of lime mask or improve the pseudophosphaturia but have scarcely any durable advantage. A mixed diet is best. Cases of this kind are classed variously as neurasthenia, arthritism, vasomotor neuroses, intestinal neuroses, and catarrh of the bowel, but he thinks they form a group apart in themselves.

75. **Operative Treatment of Ankylosis of the Elbow.**—Ceccarelli reports complete restoration of function in a case of traumatic ankylosis of the right elbow in a girl of 16. After the parts of the joint had been mobilized, a strip from the patient's fascia lata was interposed and the elbow can now be used normally. The interposed flap prevents the bones from growing again and also prevents formation of new bone, while it answers a useful purpose from the first in preventing pain when the joint is exercised passively and actively. It permits this to be begun from the very first, although extremely gently but perseveringly.

76. **Primary Tumor of Peripheral Nerve.**—A tumor in the posterior tibial nerve in a man of 51 was as large as an egg, but it had its own capsule, and Tomiselli was able to shell it out from between the fibers of the nerve, leaving the nerve intact. There have been no motor or sensory disturbances since.

Tumori, Rome

October-December, 1917, **5,** No. 4

77 *Histolysis by Leukocytes in Cancer. G. Pianese.—p. 357.
78 Sarcoma of Tonsil. C. Verdozzi.—p. 367.
79 Anatomic Findings and Results in Fifty-Five Cases of Resection of the Stomach. G. Fichera.—p. 380. Conclusion.

77. **Retrogression of Cancers.**—Pianese describes a process of retrogression of malignant growths by the breaking down of the tissues by irruption of leukocytes. The result is an atrophy and final necrosis of the blastoma cells, the outcome a sclerosis of the stroma. In the process to which he refers there is no phagocytic action by the leukocytes, or it is subsidiary to the mechanical injury from the crowding of the leukocytes. He has noted it in sarcomas and carcinomas, in glandular cancers more than elsewhere, and it is most pronounced in the young. It is most instructively studied on mammary cancers in young women. As a tentative hypothesis he suggests that the cholesterol in the leukocytes may disintegrate the lecithin in the cancer cells, and thus aid in their destruction by the mechanical crowding. Hofbauer has reported notable retrogression of malignant tumors under cholesterol general treatment.

Revista de Medicina y Cirugia Practicas, Madrid

Dec. 21, 1917, **41,** No. 1487

80 Biochemistry of Skin. D. E. de Oyarzabal.—p. 401. Conclusion.

Revista de Medicina y Cirugia, Havana

January, 1918, **23,** No. 1

81 *Status of Public Health in Cuba. F. M. Capote.—p. 5.
82 Smallpox Vaccination in Cuba. V. de la Guardia.—p. 12.
83 *Abdominal Wounds. J. Carrera and J. O. Cano.—p. 22.

81. **Public Health Problems in Cuba.**—Capote relates that malaria is extraordinarily prevalent in two Cuban provinces at present. These provinces are being brought under cultivation, while the constant stream of immigrants from others of the West Indies renders control of the epidemic very difficult. He says that more than 80,000 Chinese immigrants have been brought in under contract. "First negro slaves, then Chinese under contract, and now free men; all this cheap labor imported for the sugar plantations is an injury to the country. Hundreds of the workers now are incapacitated by malaria while their presence in the country has aggravated the sanitary and economic problems." Typhoid, cancer and infantile enteritis have all shown a slight increase during the last year. He says further, "The war has shut off from Cuba the imports on which it has hitherto mainly subsisted,

as well as the scientific current that fed the minds of the profession. This commercial isolation has forced Cuba to turn to raising and producing more to supply its needs, and I hope that the scientific isolation may in the same way stimulate home scientific production and lead to important achievements in the field of medicine."

83. **Abdominal Gunshot Wounds.**—Carrera and Cano comment on the way in which the experiences of recent campaigns and the present war have modified the old views as to the advisability of abstention in cases of gunshot wounds of the abdomen. A laparotomy should be the rule when there is the least suspicion that the abdomen has been entered. The state of shock may compel some delay, but the operation should not be abandoned on that account.

Revista Medica del Uruguay, Montevideo

November, 1917, **20,** No. 11

84 *Venereal Diseases and Matrimony. J. P. Orfila.—p. 639.
85 Tardy Cesarean Section for Contracted Pelvis. F. Cortabarria.—p. 705.
86 *Cesarean Section for Eclampsia. H. G. San Martin.—p. 709.

84. **Venereal Diseases and Matrimony.**—Orfila discusses from every angle of the subject the relations between and the bearing of venereal diseases on marriage. If every measure recommended by him could be put into practice there would be a considerable diminution in the number of marriages, but, bit by bit, everything needful for the welfare of the state as well as of the family would be done. He advocates wider diffusion of the prophylactic measures against venereal diseases, and that primary syphilis and acute gonorrhea should be treated more energetically and effectively so as to minimize the severity of the consequences and complications of both diseases. Cooperation between the doctors and the public is very essential. All doctors, specialists and general practitioners, should make common cause of instructing the public that gonorrhea and syphilis must be surely treated from the very first day of the disease with energy and perseverance. One of the means of making this propaganda more effective, Orfila says, is to call the attention of the public in a special way to the dangers of latent syphilis and latent gonorrhea from the viewpoint of matrimony.

86. **Cesarean Section in Eclampsia.**—Martin reports the case of a woman, 30 years of age, over seven months pregnant, who entered the hospital in a comatose state. She had vomited the day before and again during the night when she also had a convulsion which lasted ten minutes. Half an hour later she had a second attack. Two hours later she had a third attack while on the way to the hospital. During the examination she had a fourth attack. She remained comatose all the time. The urine contained 14 gm. of albumin per liter; the pelvis was slightly contracted; the mouth of the uterus was closed. Three hundred grams of blood were withdrawn under ether anesthesia. One hour later she had another convulsion, very severe this time, and shortly afterward she had a sixth. During all of this time the patient was blind, presented a generalized anasarca or edema, and only 100 gm. of urine were excreted. Morphin was injected in sufficient quantity to keep the patient quiet, but in spite of such treatment the patient had another convulsion. Martin then performed a classical cesarean section. A dead fetus was extracted. The uterus was closed in two planes with No. 4 catgut, but in spite of tying three knots, the sutures tore through, which leads the author to prefer No. 3 catgut, or a double strand of No. 2. The abdominal wall was closed in the usual way. The patient became very quiet after the operation; the amaurosis disappeared; respiration became normal. The patient left the hospital on the fifteenth day. The author is of the opinion that this operation is one that should be performed more often in cases such as this, but cautions against using a catgut that is too heavy.

Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam

Dec. 1, 1917, **2,** No. 22

87 *Death from Electricity. C. W. G. Mieremet.—p. 1951.
88 Constitutional Eosinophilia. D. Klinkert.—p. 1972. To be continued.
89 Pigmented Urticaria. J. B. S. Schwab.—p. 1977.

87. **Fatal Electric Shock from Incandescent Bulb Light.**—Mieremet gives a comprehensive summary of what is known in regard to electric shock and means for dealing with apparent death from electric shock, and then describes a fatal case. The man was robust and heavily clothed, although it was a hot day. He was engaged in repairing a boiler from beneath and had been at work there an hour or two by the light of an incandescent bulb on an extension wire. Fifteen minutes after returning to his task after an errand elsewhere, the sound of his hammering was no longer heard and he was found dead. The only sign of injury was on a finger of the left hand which showed charred tissue where it lay against the bulb, and on the upper part of the right arm which showed merely a whitish greyish spot about 2 cm. in diameter. It felt hard and the corium seemed a little firmer than in the surrounding tissue but there were no traces of hemorrhage or effusion and the muscles seemed normal. The epidermis over the median side of the belly of the biceps was somewhat raised, as by a blister. The heart was relaxed, filled with fluid blood, and the lungs were edematous, which he interprets as evidence that the passage of the current through the heart had caused the *trémulations fibrillaires* to which the fatal outcome of electric shock has been ascribed by French writers.

He emphasizes the peculiar whitish appearance of the spot on the arm. The microscope showed it to be a coagulation necrosis, the collagen fibrils of the connective tissue having been fused, probably by the heat generated by the current under the resistance offered by the skin. The electric bulb in question had an unusually narrow porcelain ring, the copper projecting beyond it and thus affording a chance for contact with the current. It was an alternating current of 220 volts. Mieremet urges others who have occasion to study cases of electric shock to examine for the whitish greyish patch such as he found in this case, and regards as characteristic of electric injury, and begs them to communicate with him. He is prosector at the Institute for Pathology at the University of Groningen.

Hospitalstidende, Copenhagen

Dec. 19, 1917, **60,** No. 51

90 *Variations in the Hydrogen Ions in the Blood in Different Diseases. C. Sonne and Jarløv.—p. 1247.

Dec. 26, 1917, **60,** No. 52

91 *Scarlet Fever Epidemic in Greenland. S. Barchalia.—p. 1271.
92 *Stain for Protoplasm of Bacteria. M. Claudius.—p. 1276.
93 Perforating Ulcer of the Rectum in Woman of Sixty-seven. C. E. Uldal.—p. 1280.

90. **Hydrogen Ion Content of the Blood in Different Diseases.**—Sonne and Jarløv found the range between 7.28 and 7.33 in twelve normal persons. The findings in nineteen patients with various diseases are tabulated in minute detail. The range was likewise very small even with pronounced heart and kidney insufficientcy, the reaction of the blood displaying remarkable constancy through the heart and kidney disease and diabetes (three cases), even up to the terminal phase.

91. **Scarlet Fever in Greenland.**—Barchalia reports a mild epidemic of scarlet fever in a Greenland colony with 377 inhabitants. Only children were affected, but at the same time there was an epidemic of infectious sore throat among the adults—a total of forty cases. Except for two cases of scarlet fever in 1877, the disease has never appeared before in this colony. Barchalia gives various reasons for assuming that both epidemics were true scarlet fever only that the adults did not develop the eruption. The child skin is more sensitive.

92. **Stain for Protoplasm and Cilia of Bacteria.**—Claudius describes a chromic acid and anilin oil method which shows up the protoplasm and cilia of typhoid and other bacilli with a wealth of details. It makes the aspect of the bacteria as different, he says, from the ordinary microscopic picture as a roentgenogram differs from the ordinary photograph. The glass on which the specimen rests takes the stain intensely and the protoplasm allows the stain to pass through to the nucleus, but the protoplasm itself does not take the stain.

Nordiskt Mediciniskt Arkiv, Stockholm

October, 1917, **50**, Internal Medicine Section, No. 1-2

94 *The Lungs with Valvular Heart Disease. J. Tillman.—p. 1.
95 Segmental Innervation of the Abdominal Muscles. G. Söderbergh.—p. 32.
96 *Ascites with Cirrhosis of the Liver. M. Simon.—p. 42.
97 *Differential Diagnosis between Large Cavities and Pneumothorax. S. Zandren.—p. 163.
98 The Leukocyte Aposomes. A. Nyfeldt.—p. 182.
99 *Difference in Affinity for Silver Stains between Living and Dead Bacteria. A. Nyfeldt.—p. 184.

94. **The Lungs with Valvular Disease.**—Tillman relates that a young woman with valvular defect in the left heart presented for nine months symptoms on the part of the lungs which were accepted as unquestionable evidence of pulmonary tuberculosis, notwithstanding the negative bacteriologic findings. Then with symptoms of failing compensation the young woman died, and necropsy revealed merely chronic hyperemia in the lungs from stasis plus chronic catarrhal bronchopneumonia, with nothing to indicate tuberculosis anywhere. Roentgen examination would have cleared up the diagnosis during life. Another young woman with similar valvular stenosis was sent to a sanatorium and treated for pulmonary tuberculosis after a moderate hemoptysis, but the roentgen findings suggested that the trouble was only the brown induration of the lung tissue common with mitral stenosis, and necropsy soon confirmed this assumption. Hemoptysis may thus occur from this chronic passive hyperemia in the lungs alone, and nothing but the roentgen findings can be depended on to interpret it. Six other cases are described in which under the influence of mitral stenosis the lungs seemed to be the seat of tuberculous processes, but the roentgen or necropsy findings disproved this or showed extremely attenuated tuberculous infection. No special difference between the right and left lung was apparent in this respect. The symmetrical aspect in the roentgen picture is striking. The more localized, spotty or cloudy aspect of tuberculous changes along with the brown induration are easily recognized. He reviews the literature on the rarity of pulmonary tuberculosis with mitral stenosis and with heart disease in general. With the brown induration from mitral stenosis there may be slight dulness at the apex, with slight modification of the breathing sounds, resembling the findings with incipient pulmonary tuberculosis, and there may be moist râles in one or both apices, or consonating râles at one apex or just below, along with modification of the resonance and the breathing murmurs. These physical symptoms may persist unchanged for weeks, months or years, without apparently direct connection with lost compensation. There is no certain means of distinguishing between the hemorrhage from stasis and the tuberculous hemorrhage, and the most profuse hemoptysis may be induced exclusively by stasis from valvular defect.

96. **Ascites with Cirrhosis of the Liver.**—Simon's long study of this subject fills 121 pages. He aims to draw up the balance sheet for operative treatment of ascites from cirrhosis of the liver, comparing the outcome of the cases with and without omentopexy. Twenty-eight pages are devoted to tabulation of the classified cases, and forty pages to the more typical case histories. His compilation of operative cases includes 212 published by forty-two different operators. He restricts the list to the Talma-Morison operation, that is, to attempts to ensure the development of an adequate collateral circulation. One point brought out by the compilation is the better prospect for success from the operation for Laennec's cirrhosis when the patients are in the thirties, instead of in the fifties, although successful cases are known in patients of 60 or more. Compared with these 212 cases, are 142 cases at the Stockholm hospitals in which there was no surgical intervention. The cases in which syphilis is responsible for the cirrhosis give by far the best prognosis in all cases of ascites, provided the syphilis is treated.

Comparison of all this material shows that the cases of cirrhosis of the liver with ascites fall into two great classes; those in which the ascites is the result of progressing obstruction of the portal system by the encroaching cirrhosis—a purely local trouble, and those cases in which the portal system is not much obstructed but the weakness of the heart action entails the ascites. In the first group, omentopexy to aid in development of collaterals offers great chances for relief and an approximate clinical cure. Without some such intervention the patient is doomed. In the other group, the immediate prognosis is less grave, and omentopexy will have little influence on the course of the case. It should be considered only as the very last resort in this group, after failure of treatment of the heart disease and possible syphilis. Elements which might turn the scale in favor of an operation are a good general condition, integrity of the omentum, age under or near 40, absence of jaundice, and the presence of very little extreme atrophy. It is encouraging to realize, also, he says, that patients in very bad condition, with extreme atrophy and jaundice, and others almost 70 years old have occasionally been successfully treated by operative means. Unfavorable findings with functional tests, etc., are thus not an absolute contraindication. Simon adds that an exploratory laparotomy is the only means to determine the condition of the omentum and differentiate the true nature of the liver disease. He advises it as a routine measure when the abdomen has to be repeatedly tapped. The omentofixation can be extraperitoneal or by Morison's intraperitoneal technic. He suggests that it might be worth a trial to supplement the omentopexy with introduction of a silver button with a passage through the center, leading from the peritoneal cavity into the subcutaneous tissue.

97. **Lung Cavity Simulating Pneumothorax.**—A woman of 44 with bilateral pulmonary tuberculosis was supposed to have a pneumothorax on the left side, with adhesions. This assumption was based on the history of attacks of pain in the side, with dyspnea, fever and chills; and the facts that dyspnea was the predominating symptom during the last few years, with occasional periods of collapse; that percussion gave a metallic tympanitic ring; that the respiration sound was weakly amphoric with râles only at the apex, and that the roentgen findings positively confirmed the physical diagnosis. Necropsy revealed that what had been supposed to be merely pneumothorax was a huge cavity, the entire lung destroyed. There had been very little bleeding from the lung at any time, and comparatively little sputum. Zandren has found three similar cases on record. As the physical findings are so misleading, an exploratory puncture may be necessary if bronchophony and the pectoral fremitus are not decisive.

99. **Silver Staining of Living and Dead Bacteria.**—Nyfeldt gives a colored plate to illustrate his statement that dead bacteria stain prominently with silver nitrate while living bacilli display no affinity for it. He experimented with fifty specimens of streptococci, colon bacilli, etc., leaving the bacteria in a 5 per cent. solution of silver nitrate for twenty-four hours, concluding with neutral red. The killed cultures show black, and only the living bacteria show red.

Ugeskrift for Læger, Copenhagen

Dec. 20, 1917, **79**, No. 51

100 *Symptom of Internal Ear Disease. S. H. Mygind.—p. 2019.

100. **Diagnosis of Internal Ear Disease.**—Mygind's patient, an elderly woman, had been having suppuration in the left ear for two months, with sudden and extreme dizziness and slight nystagmus. No other symptoms could be elicited until the patient was given Bartels' biconvex glasses. These prevent fixation and accommodation and thus check the nystagmus movements, but they serve as a magnifying glass for the observer. He saw through them that both eyeballs were making small horizontal rotary movements from side-to-side in a regular rhythm synchronous with the pulse in the radial artery. Modifying the circulation in the labyrinth by compressing the left carotid, started powerful nystagmus to the sound ear at first, and then it changed to an opposite nystagmus, accompanied by great dizziness. He accepted these phenomena as indicating the existence of a fistula in the labyrinth, and that this fistula had become obstructed by granulations or other cause, the vascular tissue pulsating and thus forcing the endolymph to and fro through the ampulla. The operation confirmed this assumption in every detail, not only in this but in two other cases in which he could elicit nystagmus by pressure on the carotid artery.